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ETHNOLOGY.—*The Wesorts of southern Maryland: An outcasted group.*[1] WILLIAM HARLEN GILBERT, Jr.,[2] Library of Congress.

The Wesorts are a people of mixed racial origin who live in parts of southern Maryland (Semmes, 1944, p. 6; Speck, 1922, p. 11; Weslager, 1943, pp. 156, 158). The origin of their name, as well as of the people themselves, is shrouded in mystery. It would appear that they are mainly of white and Indian blood with an occasional strong infusion of the Negro element. The distribution of these people is rather limited, being confined to Charles County and the adjacent parts of Prince Georges and St. Marys Counties. No accurate data have been secured on their numbers in the various communities and neighborhoods of this area. Because of their location in close proximity to Washington, D. C., a number of them have migrated in that city. Nowhere, either in Charles County or the other counties, do the Wesorts constitute more than a small fraction of the general population, which is almost evenly divided in numbers between the White and Negro races.

The origin of the name "Wesort" has been explained in several ways. The most simple and plausible theory attributes the origin to the phrase "we sorts are not the same as you sorts," which was employed by them in speaking to the Negroes of the area (White, 1939). This idea seems to accord with the dominating motif of Wesort existence, namely, a desire to be held a distinct race from the Negro. In this connection it might be noted that the birth certificates and marriage licenses issued to these people generally have the race indicated as "Colored-Wesort." The name "Wesort" has been employed among these people as far back as 1900 and possibly for 10 to 20 years before that date, as we shall see.

A second theory attributes the origin of the name to a corruption of an Algonquin term "witchott," which is said to mean an oval house of bark. No source is given for this word or any evidence for the change into Wesort (Maynard, 1941, p. 76). A third theory might be advanced with more credibility that the term is derived from the word "Wisoes," which was used to denote the peace councillors of the early Algonquin tribes in southern Maryland (Writers' Program, 1940, p. 20). This view might be reinforced by the suggestion that the Indians who survived in this area were the friendly or peaceful tribes, who were later called Doeg Indians. On the other hand, when the early date of disappearance of Indian languages in Maryland is considered along with the comparative recency of the use of the term "Wesort," it hardly seems possible that the aboriginal name should have survived without some notice.

Concerning the origin of the Wesorts there are again several theories. All these admit the presence of an Indian element in the Wesorts, but they differ as to their explanation of the White or Negro elements. One hypothesis attributes the White or non-Indian blood to escaped indentured

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[2] The helpful suggestions and communications from the following persons have been, among others, of the greatest assistance in the compilation of materials for this paper: Dr. Daniel S. Fisher, Maryland County Health Officer for Charles County at La Plata; H. Holland Hawkins, resident of La Plata; Philip S. Proctor, of the U. S. Bureau of Internal Revenue, Washington, D. C., a Piscataway Indian and former resident of Popes Creek in Charles County; and the Rev. Herman I. Storck, of St. Ignatius Church, St. Thomas Manor, Chapel Point (Bel Alton P.O.), Charles County.

servants who fled to the swamps and frontier to live with the Indians during the earlier colonial period (communication from Dr. Daniel S. Fisher). Another guess attributes the non-Indian blood to Spanish sailors wrecked on the shores of early Maryland at an unknown date (Warner, 1939). It is worth while to note that dark complexion in several mixed groups of the eastern states, the Melungeons of Tennessee, the Moors of Delaware, the Turks of South Carolina and the Cubans of North Carolina, is attributed by these people themselves to Latin or Mediterranean origins which helps to avoid what they consider the stigma of possible Negro crossing. A similar notion is represented in the theory that French-Canadian traders intermarried with the Indians of Port Tobacco in the seventeenth century and sired the Wesorts. This theory might explain the religion but hardly the English family names of these people.

The origin of the Indian element in the Wesorts is explained by the great number of friendly Indians who were gradually converted to Roman Catholicism by Father White and his coworkers and who were settled in reservation areas in western Charles County during the colonial period (Semmes, 1937, p. 303; N. Y. Times, Mar. 19, 1940; Writers' Program, 1940, p. 21). At the time of the earliest discovery in the seventeenth century there were, along the Potomac shores of Maryland, a number of small streams and swampy tracts that were the habitats of individual tribal groups bearing the same names as these water courses (Semmes, 1929, pp. 195–209). Thus we find in St. Marys County the Chapticon and the Wicomico (Secowocomoco) along the Chaptico and Wicomico Rivers; in Charles County the Zekiah (Za, Pangayo, or Saco) along the Zekiah Swamp, the Potopacs of Port Tobacco, the Nanjemoy of Nanjemoy Creek, the Chicamuxen and Pomonkey along creeks of the same name, and the Mattawoman of the upper Mattawoman Creek; in Prince Georges County the Piscataway of Piscataway Creek and the Patuxent along the middle course of the Patuxent River; and in the District of Columbia the Iroquoian Anacostans along the Anacostia River. Of these the Piscataways held themselves to be the natural leaders and somewhat above the rest. In the course of colonial Indian wars the Piscataways were expelled from Maryland and only a few families survive in the State today, at Point of Rocks south of Frederick, and at one or two other points. The fate of the other tribes is not yet well known.

The location of the early Indian groups in southern Maryland was naturally conditioned by the means of subsistence in terms of local topography. Communication was almost entirely by canoe and along the streams or bays which led inland from the sea. There may have been some use of the inland higher ridges for occasional hunting or for corn and tobacco raising. In the main, however, Indian settlements were in or near swamps and streams where game was easy to find and defense from northern marauders was more effective. Apparently each stream and swamp constituted the hunting area of some particular Indian group which excluded outsiders. The still surviving early St. Ignatius Church at Chapel Point well illustrates in its location the importance of water travel in early Maryland for both Whites and Indians. This Church is situated on a prominent headland on the Potomac, easy of access by water from various parts but at a distance of two miles from the main axis of present-day settlement at Bel Alton.

Today the communications in southern Maryland are primarily by land and the chief roads tend to follow the ridges or highest ground between streams. This in turn has affected the distribution of both White and Wesort farmsteads. The farms are located along the main north and south highways and the branch roads from these. The main concrete road through Charles County today is United States Highway No. 301, and this seems to be the main axis of Wesort settlement from Upper Marlboro, the county seat for Prince Georges County, in the north to Faulkner or Lothair in the southern part of Charles County. The roads of today, which mark out the ridges between streams, would serve as the boundaries of the ancient tribal areas which centered in the streams themselves. It has been said that some of the Wesorts of

Allen's Fresh at the mouth of Zekiah Swamp still assert that they are of the Za tribe, while those to the west along Nanjemoy Creek claim descent from the Nanjemoy Tribe.

The Whites and Negroes of Charles County have their own neighborhood and community groups (Dodson and Woolley, 1943). The following community groups or neighborhoods may be said to include the chief Wesort locations in Southern Maryland: (1) In Prince Georges County there are (a) "Proctorville" near Cedarville, (b) the Thompsons near Brandywine, and (c) the Swans near Croom; (2) in Charles County there are (a) Pomfret to the northwest of Port Tobacco, (b) La Plata, the county seat, (c) Port Tobacco, southwest of La Plata, (d) Waldorf and White Plains, north of La Plata, (e) Glymont and Indian Head on the Potomac near the mouth of the Mattawoman Creek, (f) Pamonkey east of Indian Head, (g) Hill Top and Pisgah south of Indian Head, (h) Bel Alton and Chapel Point, south of La Plata, (i) Faulkner (Lothair), south of Bel Alton and including Diggs Crossing, (j) Popes Creek south of Faulkner, and (k) Allen's Fresh at the mouth of Zekiah Swamp. The Wesort neighborhoods in the Chaptico Creek area of western St. Marys County are not yet ascertained.

On the outskirts of the settlements such as those immediately south of Waldorf on Highway No. 301 one can pass both Negro and Wesort dwellings in driving through. In the District of Columbia one of the first parts to be reached by migrating Wesorts would be Anacostia where we find them interspersed with the Negro sections. Possibly other centers of settlement are in the Negro sections of the northwest Washington near Georgia Avenue.

The present number of Wesorts in southern Maryland is open to free estimation. The United States Census classifies them as Negroes and makes no separate enumeration. According to one source there are several hundred members of this group, while a second ventures the more specific figures of anywhere between 750 to 3,000 persons (Semmes, 1937, p. 503; N. Y. Times, Mar. 19, 1940). The St. Ignatius Church at

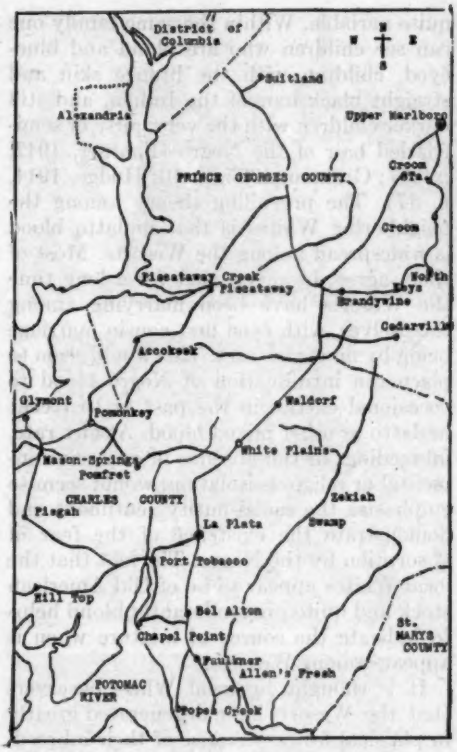

FIG. 1.—Map showing the principal points in the Wesort country of southern Maryland.

Bel Alton has a total congregation of over 850, and of these it is possible that Wesorts number 175 to 200. Since the total population of the Bel Alton area is around 1,000 persons, it is possible that the Wesorts may constitute as much as 20 percent of that number. An accurate census of the Wesort population by a house-to-house canvass would go far toward clearing up certain basic problems of identity and relative strength of numbers. It is to be hoped that the Census Bureau, with its keen appreciation of statistical needs, will in the Census of 1950 tackle this problem on its own doorsteps, so to speak, as well as it has that of enumerating the Croatans in North Carolina. We shall have occasion to refer to the great value of even indirect Census data in a later connection in this paper.

The physical traits of the Wesorts, as might be expected in a mixed group, are

quite variable. Within the same family one can see children who are blond and blue-eyed, children with the bronze skin and straight black hair of the Indian, and still darker children with the very curly or semi-frizzled hair of the Negro (Footner, 1942, p. 357; Graham, 1935, p. 10; Hodge, 1914, p. 17). The prevailing theory among the neighboring Whites is that mulatto blood is widespread among the Wesorts. Most of them agree, however, that for a long time the Wesorts have been marrying among themselves, with even first-cousin marriage being by no means rare. This would seem to place the introduction of Negro blood to occasional entries in the past or to recent mulatto or other mixed blood. At any rate, inbreeding, in the absence of any environmental or religious isolation, would seem to emphasize the racial-purity sentiment and demonstrate the existence of the fear of absorption by the Negro. The fact that the local Whites appear to be of Old American stock and quite preponderantly blond helps to indicate the source of mixture when it appears among Wesorts.

It is thought by local White observers that the Wesorts have degenerated greatly in physical fitness because of their inbreeding. Among other traits said to have developed among the Wesorts are albino skin and hair, early deafness, palsy and nervousness, epilepsy, bandy legs, near blindness, toothlessness, and stuttering speech. Idiocy and dull-wittedness are also said to occur all too frequently among them. Yet we have the contradictory observation of others that Wesorts are quite normal in mental faculties and even occasionally very bright. The Wesort young women are conceded by these observers to be very frequently rather pretty and attractive even from their own (i.e., the White) point of view. It is said that Wesorts prefer to marry out into the White group and that those who marry Negroes are ostracized from their ranks. Owing to the Maryland law against racial intermarriage between Whites and Negroes (and Negro cross breeds to the third generation) it is doubtful whether legal unions can be contracted between Wesorts and Whites.

Early marriages are the rule among Wesorts, and large families of eight to ten children are frequent even today. In the absence of figures on infant mortality it is not possible to say that the population of this group is rapidly increasing, although it might be expected. The extent of the migration outward to Washington, D. C., Baltimore, and Pennsylvania must be a factor to be kept in mind also.

The Wesorts are practically 100 percent Roman Catholics in religion; however, this does not mark them off from their neighbors since both the Whites and Negroes of this part of Maryland are mainly of the same faith.

The school question is perhaps the greatest stumbling block for the Wesorts. Illiteracy is widespread among the older generation, and this is said to be due to their having refused to attend Negro schools in their youth. It is also said that a few years ago some of the younger generation of Wesorts attempted to enter White schools but upon discovery were forced out. Some now attend the Negro schools, as for example at Bel Alton, but it is doubtful whether this constitutes a majority of the Wesort children.

The local Whites assert that the older generation of Wesorts are honest, reliable, industrious, and good humored but that many of the younger generation have been ruined in their morals since the bootlegging period under the national Prohibition Law of 1919–1933. A number of these younger persons are said to be outlaws and ne'er-do-wells.

The occupation of 90 percent of the Wesorts is farming, farm labor, or domestic employment. They are also accounted able hunters, guides, and fishermen. Only a few, however, own their own farms. The vast majority are poor rural folk, but they are said never to apply for public relief even though they may be in the worst of straits. The local Whites account them as excellent farm tenants and farm workers but say that they are very proud and will not hire out where they are expected to mingle with the Negro help. In serving meals to the Wesort hired help separate tables must be used so that they do not sit down with Negroes.

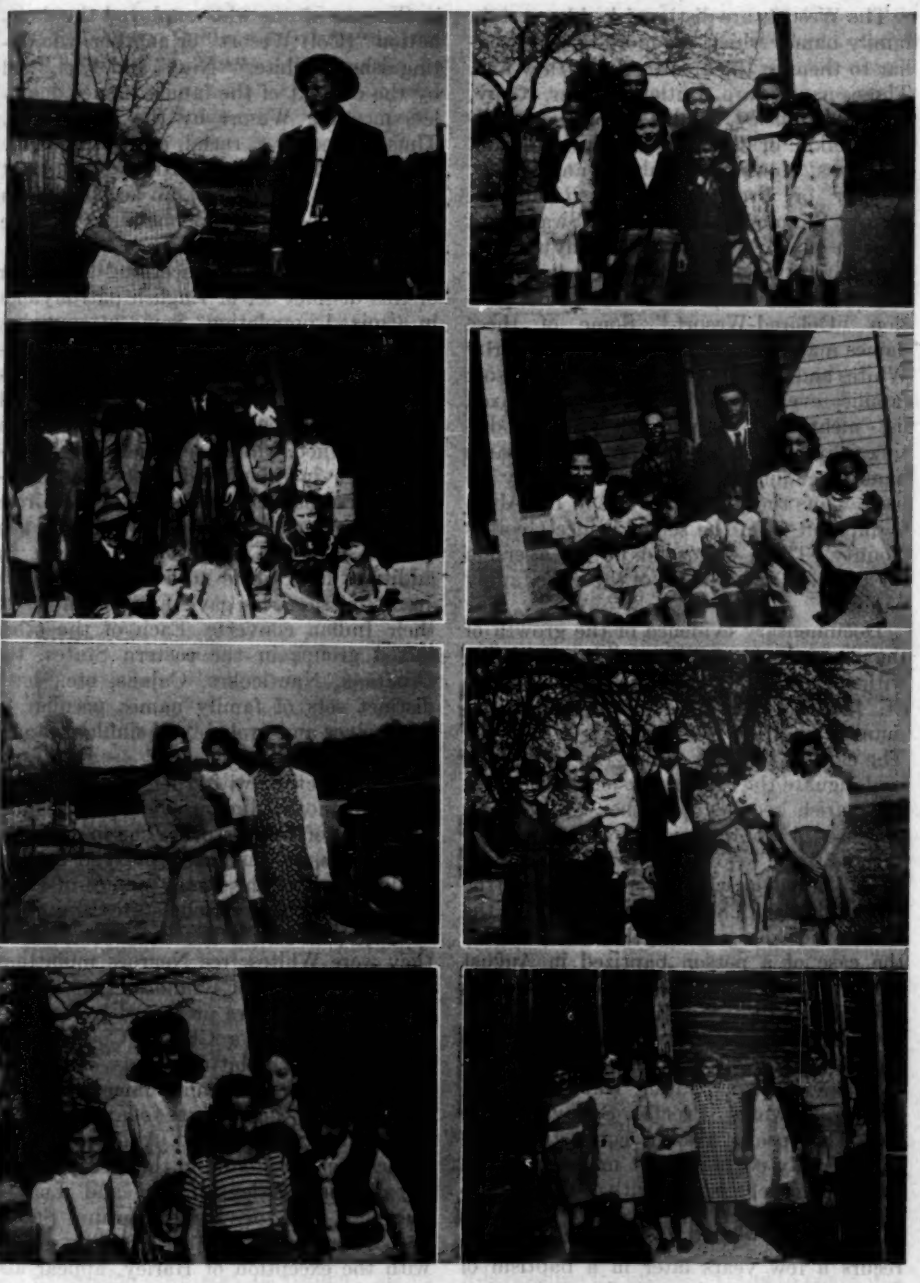

FIG. 2.—Photographs of Wesort families and individuals showing divergent racial types.

The Wesorts are distinguished by certain family names which are more or less peculiar to them in the area in which they live. These names are Butler, Frazer, Gray, Harley, Hensley, Hollis, Holly or Holley, Linkin or Lenkin, Marshall, Mason, Mathews, Newman, Neale, Penny, Perry, Proctor or Procter, Queen, Richmond, Savoy, Simmonds, Swann or Swan, and Thompson. As we have already stated, these names occur in public records of marriages, births, etc., with the race designation "Colored-Wesort." Some of these names may also be family names of nearby Whites and Negroes, but none of the Wesort families ever seem to stray from the fixed list mentioned above. In order to distinguish the various families of the same name the qualifying word "set" may be used. Thus the set of Proctors in Bel Alton is different from the set in Prince Georges County. There seems to be no aversion for a man to marry a girl of the same family name.

Documentary evidence of the growth of the use of the term "Wesort" in connection with certain family names is afforded at the St. Ignatius Church at Bel Alton (communication from the Rev. H. I. Storck). The earliest practice during the 1880's was to designate the race of persons baptized in the parish records as either "White" or "Colored." Abbreviations for Latin terms such as "Nig." (for Latin *niger*, black) and "Alb." (for *albus*, white) were also used to the same purpose. The first occurrence of the term which designates a third race was in the case of a person baptized in August 1896, in which the race was designated as "We-sort." In the years 1899, 1901, and 1902 this term recurs with increasing frequency and always in connection with family names such as Butler, Harley, Linkin, Mason, Newman, Proctor, Savoy, Swann, and Thompson. Also in connection with these family cognomens it might be noted that the race of a person with a Wesort family name baptized in November 1889 was designated as "Yellow" and the same term recurs a few years later in a baptism of September 1896. Apparently each priest employed his own method of indicating the three different racial groups, as for example in the case of one who employed the designation "(Col) Wesort" or another who distinguished "White," "Nig.," and "Col." and by the context of the family names doubtless meaning Wesort by the latter term. Thus it seems a racial entity gradually creeps into recognition until at the present time Wesort has become an accepted term in the parish records for members of these family groups.

What can be said concerning the origin of this distinct set of English patronymics in a mixed population? Some attempt has been made to connect them with preexisting Indian names; e.g., Swann has been linked with Wannys, a name of several early chiefs in southern Maryland and even with Shawnee, which tribe had early representatives in Maryland. Probably, however, these names are simply derived from the white men, whose union with Indian women gave rise to this mixed group. In addition, it is to be noted that the early Jesuit missionaries gave English names to their Indian converts. Each of the other mixed groups in the eastern States, the Croatans, Nanticokes, Cajans, etc., have distinct sets of family names peculiar to themselves and probably of similar manner of origin.

In connection with their family names we have another line of evidence regarding the origin of the Wesorts. The first United States Census was taken in 1790 and included a list of the family names of heads of families in the various states and counties together with indications as to whether they were Whites, free Negroes, mulattoes, or slaves (Heads of Families, 1790, Maryland). The data are presented by counties and in the table for Charles County, Md. we find the "mulatto" heads of families bearing most of the family names which are found among the Wesorts today with other additional names as well. About 54 family names are to be found in this group including Butler, Harley, Linkin and Lenkin, Newman, Proctor, Penny, Swann, Savoy, and Thompson. All these family names, with the exception of Harley, appear also somewhat earlier among the White population of Charles County in the Constable's Census of that County of 1775–1778 (Brum-

baugh, vol. 1, pp. 297–312). So it is likely that the Wesort family names were derived from local White names sometime during the eighteenth century or possibly even earlier (Charles County was first settled in 1642) and were borne first by the "mulatto" or free Negro population of Charles County. Up to the time of the Civil War the free Negro population of Charles County is listed separately in the census statistics from the White and slave groups. It is probable, then, that in the statistics of the growth of the free Negro group some idea may be gained of the relative growth of the early ancestral Wesort population. The total number of Charles County mulattoes listed under family name groups in 1790 was 357, although the census of 1790 officially tabulates 404 free Negroes in that county. The growth of the free Negro population in relation to the other elements of the population may be seen from the following table compiled from the census records.

TABLE 1.—CHARLES COUNTY, MD., POPULATION BY RACE, 1790–1860

Year	Whites	Free Negroes	Slaves	Total
1790	10,124	404	10,085	20,613
1800	9,043	571	9,558	19,172
1810	7,398	412	12,435	20,245
1820	6,514	567	9,419	16,500
1830	6,789	851	10,129	17,769
1840	6,022	819	9,182	16,923
1850	5,665	913	9,584	16,162
1860	5,796	1,068	9,653	16,517

The Census of 1870, owing to the freeing of the slaves during that decade, shows a free Negro population of 9,318 and thus can no longer be said to include primarily the Wesort ancestral group. It would seem that the Civil War, by obliterating the distinction between free Negro and slave in Charles County, stimulated the former group to invent a term to designate themselves as a distinct group, namely "Wesort." According to a tradition among these people, it was "Aunt" Sallie Ann Thompson who invented the term Wesort by constantly using the expression "we sort of people" about 1882. This was taken up by her kinsmen and neighbors and gradually spread to the entire county and beyond. If the rate of growth of the numbers of the free Negroes as indicated here continued we should expect to find around 1,900 of these people in Charles County by 1940. The following table illustrates the growth of the White and Negro population of the county since 1860.

TABLE 2.—CHARLES COUNTY, MD., POPULATION BY RACE, 1870–1940

Year	Whites	Negroes	Total
1870	6,418	9,318	15,738
1880	7,700	10,848	18,548
1890	7,054	8,137	15,191
1900	8,014	9,648	17,662
1910	7,813	8,572	16,386
1920	9,495	8,210	17,705
1930	8,674	7,492	16,166
1940	10,384	7,228	17,612

The variability of the figures in the above table is interesting. It would suggest the possibility, at least, of the Wesorts being included in some censuses as White and in others as Negro. The large rise in Negro population in 1880 and the rise of the Whites in 1940 are cases in point. Only a detailed examination of the family names in the census schedules would indicate if this were true or not.

Turning now to the social status of the Wesorts we find a most interesting situation. Their own opinion, backed to a considerable extent by that of the local Whites, is that they constitute an intermediate caste between the White and the Negro. This is so because they refuse to be identified with Negroes yet are unable to find acceptance as social equals by the Whites. They do not decry any union of members of their group with Whites as they do those unions with Negroes. The local Negroes are inclined to belittle the pretensions to superiority which they feel are unwarranted in the Wesorts. The Whites look more favorably upon the Wesorts as reliable workers than they do upon the Negroes but are inclined to dislike the Wesorts because of degenerate traits which they ascribe to inbreeding.

The Wesorts would seem to indicate how it is possible for physical traits to result in a type of group consciousness. Keenly aware that their racial type is not that of the typi-

cal Negro they attempt to avoid those situations that classify them as Negro. "We are the Yellow People and we are different from the Negro" is the way H. S., of Bel Alton, one of the older and much respected members of the community, expresses the idea. To cite the words of another of the older and respected members of this group, L. T., of White Plains "I was born a Wesort and I am going to die a Wesort." Such a clear and simple confession of faith can hardly be disregarded by the social psychologist because it so well illustrates the "we-group" feeling so ably defined and discussed by such eminent sociologists as William Graham Sumner and Charles Horton Cooley.

The Wesorts appear to have isolated themselves from the Negro in a variety of ways. They will not eat with them at the same table, or sleep at their homes, or permit Negroes to attend their dances. Yet they seem to regard it as proper to appear at Negro recreational affairs such as picnics and outings, participating in a kind of standoffish way. White people, on the other hand, may attend Wesort funerals, weddings, and dances.

Patterns of triracial or three-way segregation are well illustrated at St. Ignatius Church at Chapel Point (Dodson and Woolley, 1943, p. 297). Here, for many years, the seats in the main body of the Church are reserved for White people, while there is a separate section in the back for the Wesort members. In addition there is a gallery running along the sides of the Church which is generally occupied by Negroes, although occasionally these people come down and sit in the Wesort section when it is not occupied. Negroes formerly used a separate door from that used by the Whites and Wesorts.

Also illustrative of the segregation principle is the ancient cemetery located just outside the church on a scenic knoll overlooking the Potomac. The grave markers around the top of the bluff near the church and for some distance downward are those of White people. The lower part of the hill constitutes the Negro section of the cemetery in which Wesorts and Negroes are buried.

It is said that formerly Wesorts were accustomed to occupying seats in busses and carriages behind the Whites but ahead of the Negroes. The same is asserted to have been true of seating in motion-picture houses. One informant tells of hunting and fishing parties made up of male members of the three races at which the whisky jug would be passed around first to the Whites, then to the Wesorts, and finally to the Negroes.

As a buffer group between the Whites and the Negroes the Wesorts have absorbed some of the shocks of racial conflict and provided a cushion to soften the process of miscegenation. One gains the impression that we have here a basically Indian group that has been gradually getting whiter through greater and greater amounts of White blood yet presenting Mendelian segregations of physical traits that recall the original Indian type. Into this mixture have apparently been introduced mulatto, quadroon, or octoroon elements.

Politically the Wesorts participate to a greater degree than the Negro in the local affairs. They vote freely and, like the traditional Negro voters, are mainly Republican by party affiliation. Like the Negroes they do not hold public office in the county. The White people of this area are mainly Democratic in party affiliation.

Two instances illustrative of the practical difficulties attending the triracial situation might be cited here. In the present World War the local draft boards have been hard put to it in classifying the Wesorts for service with the armed forces. Some have been sent into Negro battalions, while others, have been sent into White, and it is probable that some have not been inducted at all because of the difficulties attendant on their racial classification. Thus, as a result of their racially in-between position, the Wesorts have suffered an uncertainty of both present and future status. This is still further illustrated in the case of some Wesorts who located in Washington, D. C., and in view of the housing shortage wanted to locate in a district from which they were barred by the owners because of color restrictions. These Wesorts sent back anxious inquiries to their parish

priest for records to be used as proof that they were not Negroes. We are not told how they finally came out in this search for status.

What happens to the Wesorts who migrate to the city? The answer to this question would be of the greatest assistance in understanding the nature of the attitudes and barriers that interpose themselves to the absorption of the Wesorts into the general population. At present the question can not be answered but the following suggestions might be made. A study of the family names in the city directories of Baltimore and Washington would be one clue. The Baltimore City Directory from 1812 to 1923 designates its Negro population separately from the White and we find Wesort family names beginning to occur among the Negro classification far back in the nineteenth century. Similarly, the Washington, D. C., city directory indicates the Negro population separately from 1850 to 1873. During this period and after, the Wesort family names occur with increasing frequency. A follow-up study of the addresses within the cities mentioned of persons with Wesort family names and of their location with reference to White, Negro, and foreign-born areas would help still further to indicate what becomes of the urban Wesort.

What then, for practical purposes, is a Wesort? This may be answered in a general definition as a person of mixed Indian and White and possibly Negro blood who has a Wesort family name and who lives in or derives from Charles, Prince Georges, or St. Marys Counties in southern Maryland. Admittance to the Wesort category may be by birth or, as an Indian, White, or light mulatto outsider, by marriage to a Wesort.

Little remains today of the Indian heritage among these people. In fact, there seem to be no unifying cultural traits to bind them into a common unity distinct from Whites and Negroes. There are no clubs or organizations peculiar to Wesorts. They are said, however, to celebrate an annual feast day on August 15, the day of the Assumption of the Blessed Virgin Mary, which commemorates her death and miraculous ascent into heaven. This date is said to be celebrated by feasting, visits, ball games, and dances. It is also asserted that the local White Catholics do not celebrate this occasion with such emphasis. The date and seasonal timing recall the Green Corn Festival which is so widespread and important to all the Southeastern Indians and perhaps in this respect it might constitute a survival of that rite. Also peculiar to Wesorts were several baseball teams which in former years were organized by neighborhood groups and played games in a Wesort league.

Although nothing has been reported in the meager literature on the Wesorts it is quite possible that various elements of both material and nonmaterial culture, peculiar to themselves, may still survive. It is said that medicine men or native herbalists still survive at Allen's Fresh and Pomonkey and that these individuals still make arrowheads and can recount Indian traditions. Survivals in groups of this type of fish and animal traps, basketry, gourd cups, and carved wooden objects are not in themselves of much significance insofar as Indian origin is concerned. Of greater value might be their ecological linkage with such local features as the Zekiah Swamp and the old hunting territories of the Algonquins. The survival of primitive racial groups where alien invaders have mostly displaced their neighboring kinfolk may quite frequently be attributed to isolating ecological peculiarities such as swamp economy or mountain habitat.

In fact the position of the Wesorts is made much clearer if we consider them in the perspective of Indian survival groups generally on the Atlantic coast from New England to Louisiana. Many of these groups have Indian tribal names, while some like the Wesorts do not. To the north in the rugged Ramapo range between New Jersey and New York are the Jackson Whites, a mixed Indian-White-Negro group set off by topographic factors. Farther south in southern New Jersey and northern Delaware are the Moors, who, like the Wesorts, are possibly survivals of mixed Indian and white swamp dwellers of colonial times. Similar Coastal Plain swamp mixed groups occur in Virginia, North and South

Carolina, and Florida, whose names are numerous (Brass-ankles, Red-bones, Croatans, etc.) and whose separate identities have never yet been seriously studied. Like the Wesorts they do not know anything of their origin, yet hold themselves aloof from the Negro even while repulsed by the Whites. As in the case of the Wesorts they are often thought of by the White as mulattoes. Like the Wesorts again they are often thought by the Whites to be bootleggers and possible outlaws as well as good farmers and hunters. To the westward of the Coastal Plain in the Appalachian Mountains are similar groups such as the Melungeons of Tennessee and the nearly related if not identical Guineas of West Virginia.

Since many of these racial islands are occasionally visited by the western Indians and recognized by them as their coracials it has been proposed that the degenerative inbreeding of such groups as the Wesorts be compensated for by bringing in fresh blood from the larger western groups.

The Wesorts are part of this pattern of the partially assimilated aborigines not only in the United States but of the world over. In the Far East the Miao groups of southern China, and in India the pariah outcastes or untouchable groups and hill tribes all exemplify similar cases of nonassimilation and ethnic groups or minorities that have been discriminated against. A close study of the Wesorts as a type of the outcasted group should go far toward explaining the factors that are part of the world-wide impact of Europeans and their culture upon the native colored peoples of an alien tradition.

What practical policies have there been on the part of the White man in dealing with minorities of this type in the United States? It might be noted that the trend in recent years has been toward a recognition of such racial minorities in the form of separate schools and provision for corporate organization and community cooperation. Such triracial recognition has been granted the Croatans of North Carolina and to some extent to the Cajans of Alabama and Nanticokes of Delaware. Apparently such policies have been developed because of the relatively high birth rates of these groups and the localized nature of their problems and the corresponding loss of hope in the possibility of dispersion and absorption in the general population.

In a democracy the choice as to its future course must be left mainly up to the individual minority. Should the Wesorts desire to organize into a corporation or association for mutual aid, such a course is perfectly within their rights. If, on the other hand, they should desire to continue, as they have for decades, to raise themselves socially as individuals and families only, this too could only meet with the cooperation and good wishes of their fellow citizens, both White and Negro. It will be of interest to watch the effects of future contacts of the Wesorts with similar mixed groups in the eastern States.

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ZOOLOGY.—*The subspecies and intergrades of the Florida burrowing crayfish,* Procambarus rogersi (*Hobbs*).[1] HORTON H. HOBBS, Jr., University of Florida. (Communicated by WALDO L. SCHMITT.)

The first record of the presence of burrowing crayfishes occurring in the State of Florida that has come to my attention was that of Roland M. Harper (1914, p. 248). In discussing the Apalachicola flatwoods he states, "Much of the soil is too damp for ants, gophers, and salamanders, but crawfish are common in some places, if one may judge from their 'chimneys,' which are usually closed at the top, instead of open like the more familiar ones in more clayey soils farther inland." These burrows were probably constructed by one or more of the following crayfishes: *P. rogersi campestris, P. rogersi ochlocknensis, P. rogersi* intergrades, *P. kilbyi,*[2] *P. apalachicolae,*[3] and *P. latipleurum,*[4] all of which have been found in portions of the Apalachicola flatwoods.

The subspecies of *Procambarus rogersi*—*P. r. rogersi, P. r. campestris,* and *P. r. ochlocknensis*—are characterized by the structure of the first pleopod of the first form male. The mesial process is well developed, spiniform, or slightly compressed; the cephalic process is either lacking or is present as a reduced spine on the cephalodistal surface; the caudal process is large and thumblike, bent mesiad at a 15°–90° angle with the main shaft; the central projection is large and platelike, directed across the cephalodistal surface or obliquely distad in a cephalomesial to caudolateral direction. Hooks are present on the ischiopodites of only the third pereiopods of the male.

The subspecies are distinct, though forming at times unmistakable intergrades. Their ranges cover a considerable area in the eastern and central parts of the panhandle of Florida. The extreme eastern and western limits of the ranges of this assemblage are almost 100 miles apart, while the most northern and southern limits are separated by a distance of about 50 miles. Within these limits are portions of Bay, Gadsden, Gulf, Calhoun, Franklin, Leon, Liberty, and Wakulla Counties.

All three are primary burrowers,[5] with presumably poor powers of dispersal. Their ranges extend through a monotonous flatwoods, broken only here and there by small, scattered areas unsuitable for habitation by them. If *rogersi* had a higher vagility, such a range would seem to favor maintenance of a homogeneous population over the entire area, but instead the region is inhabited by small, local, inbred populations. When specimens from several of these are compared, it becomes evident that the subspecies of *P. rogersi* and their intergrades form a very heterogeneous complex.

The zone of intergradation consists of a large area in Franklin, Gulf, and Bay Counties and the southern parts of Liberty and Wakulla Counties. Toward the eastern side of this area, in eastern Franklin and western Wakulla Counties, specimens show a definite approach to *rogersi campestris,* which occurs in Leon and Wakulla Counties; west of the Apalachicola River, in northern Gulf County, material is closer to *rogersi rogersi;* while in the southern part of Liberty County the intermediates in most characters more closely resemble *rogersi ochlocknensis.* In general, the nearer one approaches the ranges of each of the three well-defined subspecies, the more nearly do the intermediates resemble typical material of the subspecies from that particular part of the range. The actual situation in respect to the intergrades is more complex than is here indicated and will be discussed more in detail following the descriptions of the subspecies.

SYSTEMATIC DISCUSSION

KEYS TO THE SUBSPECIES OF PROCAMBARUS ROGERSI[6]

Males

1. Caudal process of first pleopod bent but not so much as at a right angle to the main shaft of the appendage.....2

[1] Contribution from Department of Biology, University of Florida. Received February 27, 1945.
[2] Hobbs, 1940, p. 410.
[3] Hobbs, 1942b, p. 55. [4] Hobbs, 1942b, p. 52.

[5] Primary burrowers are those crayfish that spend practically their entire lives in their burrows.

[6] It is not possible to construct a key to the intergrades of the several subspecies of *P. rogersi.* These are fully discussed on page 257.

Caudal process of first pleopod bent at a right angle to the main shaft of the appendage.. ..... *rogersi rogersi*

2. Central projection of first pleopod directed laterad across the cephalic face of the appendage..... *rogersi campestris*

Central projection of first pleopod directed obliquely caudolaterad from the cephalodistal surface..... *rogersi ochlocknensis*

Females

1. Annulus ventralis only slightly if at all broader than long, usually longer than broad; cephalic margin cleft, with strongly developed tubercles.....2

Annulus ventralis much broader than long; cephalic margin entire, with or without very low, rounded tubercles..... *rogersi rogersi*

2. Annulus ventralis subcylindrical; caudal half not anywhere flattened; cephalic half troughlike..... *rogersi campestris*

Annulus ventralis much longer than broad; caudal half flattened below with a single large, median, dome-shaped structure; cephalic half vatlike..... *rogersi ochlocknensis*

Procambarus rogersi rogersi (Hobbs)

Figs. 2, 14, 17, 22, 25

Cambarus rogersi Hobbs, 1938, pp. 61–65, figs. 1–11; 1940, p. 410.

Procambarus rogersi Hobbs, 1942a, p. 344.

Procambarus rogersi rogersi Hobbs, 1942b, p. 89, pl. 5, figs. 71–75, map 5.

Diagnosis.—Hooks present on ischiopodites of third pereiopods only; rostrum without lateral spines, areola obliterated in middle, or almost obliterated with a single row of punctations along fusion line of branchiostegites. First pleopod of first form male with platelike central projection directed across cephalic surface, caudal process noncorneous, thumblike, and bent caudomesiad at a right angle to the main shaft. Annulus ventralis broader than long; cephalic margin entire.

Description.—PARATYPIC MALE, FORM I: Carapace subovate. Width of carapace in region of caudodorsal margin of cervical groove greater than height (1.32–1.27 cm). Greatest width of carapace about midway between cervical groove and caudal margin of cephalothorax (1.45 cm).

Areola obliterated in middle, depressed, more than half as long as cephalic section of carapace (1.17–1.69 cm).

Rostrum broad-lanceolate; apex not reaching distal end of second joint of antennule peduncle; upper surface excavate, with a row of punctations along raised margins; margins gradually tapering to apex; no lateral spines present. Apex of rostrum directed ventrad, extreme apex abruptly bent upward. Subrostral ridges evident in dorsal view for over half the distance between postorbital ridges and tip of rostrum. Rostral ridges extending forward to apex of rostrum. Postorbital ridges extending caudad more than half the distance between apex of rostrum and cervical groove.

Surface of carapace punctate dorsad; granulate laterad. No lateral spines present. Suborbital angle lacking. Branchiostegal spines small.

Abdomen shorter and narrower than carapace. Anterior section of telson with one spine in the right and two in the left posterolateral angles.

Epistome broadly sublanceolate with slightly undulant margins; terminating cephalad in a small cephalomedian tubercle.

Antennules of the usual form; no spines present on ventral side of basal segment.

Antennae hardly reaching caudal margin of carapace when bent caudad. Antennal scale small; extending almost to end of second joint of peduncle of antennule. Spine on outer margin strong.

First pereiopod very broad and flattened, triangulate, with sharp apex. Inner margin of palm with a cristiform row of eight tubercles. Both surfaces of hand as well as fingers with setiferous punctations. Both fingers with two distinct ridges. Palm with a prominent ridge along articulation with movable finger. *Movable finger:* Dorsal surface with a prominent submedian ridge extending from base almost to tip. Outer margin studded with four tubercles along proximal third; remaining distal two-thirds with about eight setiferous punctations. Opposable margin with excision slightly proximad of midlength; margin broken by two major tubercles (one at point of excision, the other near base of finger) between which are two smaller ones; four small tubercles present distad of distal major tubercle beyond which is a row of minute denticles extending almost to tip of finger. *Immovable finger:* Outer margin, in the form of a distinct ridge, with deep setiferous punctations; a few small tubercles present at base. Dorsal surface of finger with a prominent submedian ridge which curves inward at base following the general curvature of opposable margin of finger. Opposable margin interrupted by five tubercles, the second from base the largest. *Carpus* longer than broad; longer

than inner margin of palm of chela; a deep longitudinal groove above; inner surface with three large tubercles and a few scattered smaller ones. Two large, acute tubercles on distal ventromesial surface. A single large, ball-like tubercle on distal ventrolateral margin fits into a socket on lower surface of chela. *Merus* smooth except on lower surface which has an inner row of ten small, spikelike tubercles and an outer row of nine rounded ones.

Ischiopodite of third pereiopod hooked; hook strong, long.

First pleopod of male extending cephalad to base of second pereiopod. Tip terminating in three distinct parts. The mesial process, heavy but terminating in a spiniform tip, is bent caudolaterad. The cephalic process is absent. The caudal process is noncorneous, thumblike, and directed caudomesiad at a right angle to the main shaft of the appendage. The central projection is thin, corneous, and platelike and is directed across the cephalic surface of the appendage.

PARATYPIC MALE, FORM II: Differs from the male of the first form chiefly in the reduction of the sexual and secondary sexual characters, a total absence of corneous parts in the first pleopod, and a reduction of the hooks on the third pereiopods.

PARATYPIC FEMALE: Differs from the male of the first form in that the chelae are not so heavy, and there are slight variations in position and size of tubercles.

Annulus ventralis broader than long with fossa disappearing below left caudal margin. Cephalic margin entire with only very low rounded tubercles. A deep pit present in dextral half with rather steep walls except on cephalic and sinistral sides; caudal wall definitely overhanging. Sinus cutting caudal wall slightly sinistrad of midlength.

Measurements.—PARATYPIC MALE: Carapace, height 1.32, width 1.45, length 2.86 cm; areola, linear, length 1.17 cm; rostrum, length 0.28, width 0.35 cm; abdomen, length 2.40 cm; right chela, length of inner margin of palm 0.66, width of palm 1.11, length of outer margin of hand 1.92, length of movable finger 1.36 cm. PARATYPIC FEMALE: Carapace, height 1.20, width 1.27, length 2.48 cm; areola linear, length 0.96 cm; rostrum, length 0.33, width 0.33 cm; abdomen, length 2.30 cm; right chela, length of inner margin of palm 0.51, width of palm 0.88, length of outer margin of hand 1.57, length of movable finger 1.07 cm.

Type locality.—"Low pine flat-woods four miles north of Blountstown on State Highway no. 6" (Hobbs, 1938, p. 65).

Distribution.—Calhoun County, Fla.

Procambarus rogersi rogersi is endemic to Florida, and its range seems to be confined to a relatively small area in the panhandle of the State west of the Apalachicola River. Here it occupies a small area of flatwoods running north and south in the eastern part of Calhoun (and probably Gulf) County. Although no records of *rogersi rogersi* have been established in Gulf County, there are records of what I interpret as intergrades, *P. r. rogersi*×*campestris*, in the broad expanse of coastal flatwoods in the southern part of the county.

The linear form of the range of this subspecies may be explained by the distribution of the available flatwoods and the presence of the Apalachicola River on the east and the elevated strip of loamy Norfolk sand that extends on the east side of the River from Liberty County to the northern part of Franklin County. The combination of the two latter features certainly prevents migration eastward. The northern and western boundaries of the range are determined by well-drained soils that appear to form an efficient barrier to migration. The western boundary extends as far southward as the central part of Gulf County, but the southern limit of the range cannot be definitely set since the intergradation zone (*rogersi*×*campestris*×*ochlocknensis*) probably occurs in Gulf County.

Variation.—*Procambarus rogersi rogersi* seems to show little variation. In most of the specimens there is no spine present on the ventral surface of the basal joint of the antennule; however, occasionally there is a spine on one or both antennules. The cephalic process of the first pleopod of the male is generally not even present as a vestige, though occasionally it is strongly developed. The areola is sometimes not quite obliterated in middle. The epistome varies in form from semicircular to subtriangular.

Ecology.—*Procambarus rogersi rogersi* is a primary burrowing species and has been collected only in the flatwoods region around Blountstown. A definite plant association composed of pitcherplants (*Sarracenia drummondi*,

S. flava, and *S. psittacina*), sundews (*Drosera*), club moss (*Lycopodium*), wiregrass, and hatpins (*Ericaulon*) is characteristic of the flatwoods flora where this crayfish has been taken. Generally in a locality in which these plants were observed from the road, burrows of some member of the *rogersi* group were found to be present; only in a few instances have I found no crayfish burrows in a situation of this type. In many places the water table is only a few inches below the surface, in others as deep as 3 feet.

The crayfish burrows are numerous in the Blountstown region, and since the chimneys range from 4 to 8 inches in height they are easily observed. The soil is a mixture of sand and clay underlain by clay, and the pellets composing the chimneys retain their rounded shape. Most of the chimneys are somewhat carefully constructed.

P. rogersi constructs a very complex burrow, which often extends horizontally 4 or 5 feet. Usually there are several passages—some that end blindly and others that open to the outside through chimneys. Generally, as in the case of the *advena*[7] burrows, there is a single spiral passage that goes below the average water table. In some places the water is reached in less than a foot; in others it is about 2 feet below the surface. In any case, I have never had to dig more than 3 feet to reach the bottom of the passage.

In digging out a specimen from its burrow it is best to locate the deep passage and stir the water in it vigorously; allow it to become still, and within a very short time the crayfish will usually come to the surface. Occasionally it is necessary to dig to the bottom, or in some instances to dig out the entire burrow. Although most of my specimens have been taken from the deepest passage of the burrow I have found some clinging to the roots of wiregrass or of some other plant in the roof of one of the horizontal passages.

In one locality (about 8 miles north of Blountstown) the open, gently sloping flatwoods are essentially a large seepage area covering several acres. The ground is very spongy, and in spots, were it not for the heavy growth of grass, one would probably "bog down." In this locality the burrows are extremely numerous. As the water table is probably at the surface most of the year, the crayfish in their burrowing seem to expend their energy in constructing horizontal passages. In this locality the ground is so riddled with burrows that one can scarcely dig a spadeful of soil without exposing one of them.

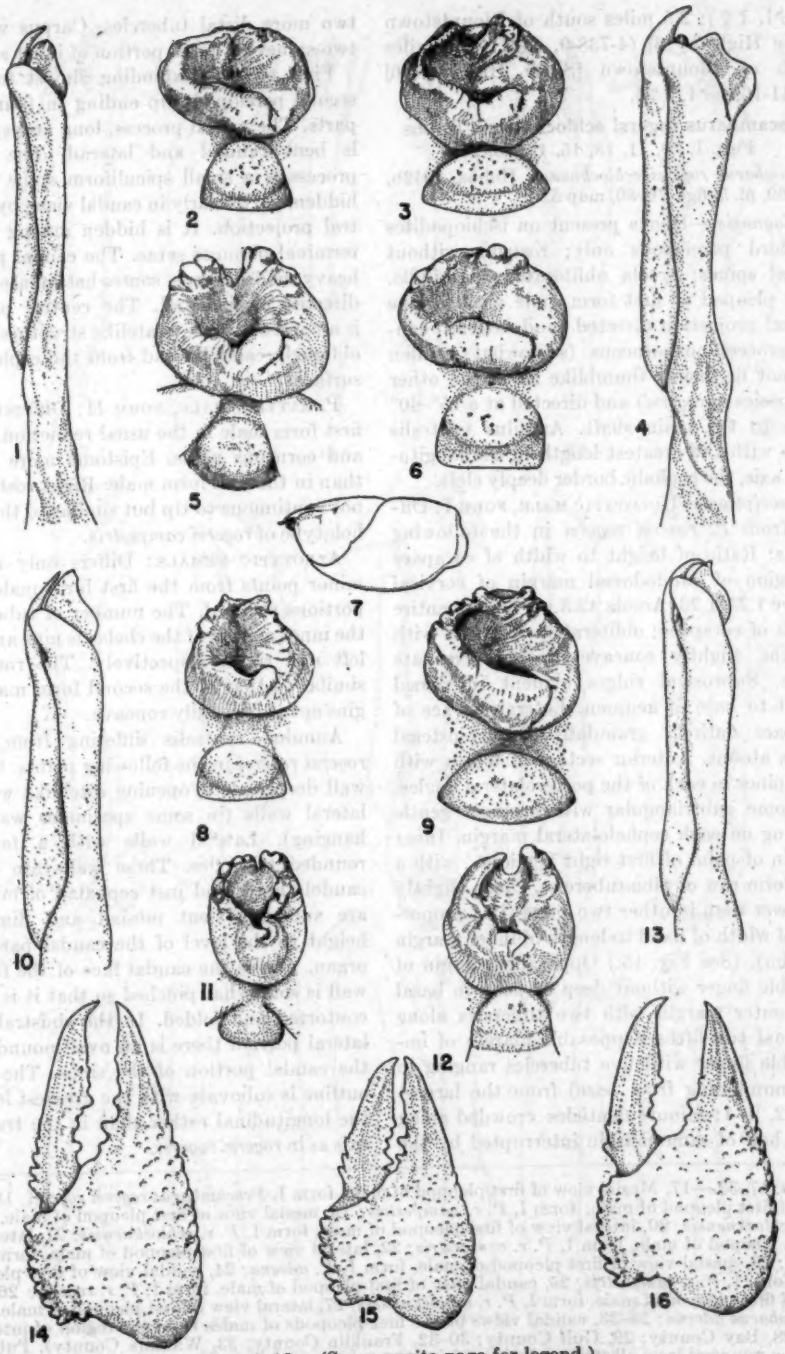
In the burrows just mentioned an amphipod (*Crangonyx* sp.), an albinistic isopod (*Asellus hobbsi* Maloney), a beetle (*Bidessus rogersi* Young), and a copepod (*Cyclops* sp.) are abundant. On the crayfish were found some of the amphipods mentioned above, a branchiobdellid [*Cambarincola philadelphica* (Leidy)], and an ostracod.

Although I have taken no other crayfish from burrows in the same habitat with *rogersi rogersi*, *P. kilbyi* was collected in large numbers from burrows and among the vegetation in a temporary stream close by.

Material examined.—CALHOUN COUNTY: 4 miles north of Blountstown [State Highway 6] (4-1335-1, 1 ♂I, 3 ♀ ♀), (4-1737-4, 2 ♂ ♂I, 2 ♂ ♂II, 1 ♀); 8 miles north of Blountstown [State Highway 6] (4-1737-2, 5 ♂ ♂I, 2 ♂ ♂II, 3 ♀ ♀), (6-938-4, 2 ♂ ♂II, 9 ♀ ♀); 9 miles north of Blountstown [State Highway 6] (4-738-11

[7] LeConte, 1856, p. 402.

FIGS. 1–16.—1, Caudal view of first pleopod of male, form II, *Procambarus rogersi ochlocknensis;* 2, annulus ventralis of *P. r. rogersi* from Calhoun County; 3, annulus ventralis of *P. r. campestris* from Leon County; 4, caudal view of first pleopod of male, form II, *P. r. campestris;* 5, annulus ventralis of an intergrade from Franklin County, west of the Apalachicola River; 6, annulus ventralis of an intergrade from Franklin County, near the Franklin-Wakulla County line; 7, lateral view of carapace of *P. r. campestris;* 8, annulus ventralis of an intergrade from Franklin County 10 miles west of Carrabelle; 9, annulus ventralis of an intergrade from Franklin County 7 miles west of Carrabelle; 10, caudal view of first pleopod of male, form I, *P. r. ochlocknensis* from Liberty County; 11, annulus ventralis of *P. r. ochlocknensis* from Gadsden County; 12, annulus ventralis of *P. r. ochlocknensis* from Liberty County; 13, Caudal view of first pleopod of male, form I, *P. r. ochlocknensis* from Gadsden County; 14, upper surface of chela of *P. r. rogersi* from Calhoun County; 15, upper surface of chela of *P. r. ochlocknensis* from Liberty County; 16, upper surface of chela of *P. r. campestris* from Leon County. The drawings of the chelae (Figs. 14–16) were made from paratypes, and so there are some discrepancies in the illustrations and text in the number and distribution of tubercles. Pubescence has been removed from all structures figured.



FIGS. 1–16.—(See opposite page for legend.)

2 ♂ ♂I, 1 ♀); 2.5 miles south of Blountstown [State Highway 6] (4-738-9, 1 ♂I); 5.5 miles south of Blountstown [State Highway 6] (5-341-16, 1 ♂I, 1 ♀).

Procambarus rogersi ochlocknensis Hobbs

Figs. 1, 10, 11, 13, 15, 19, 20, 26

Procambarus rogersi ochlocknensis Hobbs, 1942b, p. 89, pl. 5, figs. 76–80, map 5.

Diagnosis.—Hooks present on ischiopodites of third pereiopods only; rostrum without lateral spines; areola obliterated in middle. First pleopod of first form male with fanlike central projection directed caudolaterad; caudal process noncorneous (somewhat swollen but not distinctly thumblike as in the other subspecies of *rogersi*) and directed at a 15°–40° angle to the main shaft. Annulus ventralis ovate with the greatest length in the longitudinal axis, the cephalic border deeply cleft.

Description.—HOLOTYPIC MALE, FORM I: Differs from *P. rogersi rogersi* in the following points: Ratio of height to width of carapace in region of caudodorsal margin of cervical groove 1.25:1.23. Areola 42.3 per cent of entire length of carapace; obliterated. Rostrum with margins slightly concave, deeply excavate above. Subrostral ridges evident in dorsal aspect to base of acumen. Lateral surface of carapace entirely granulate. Branchiostegal spines absent. Anterior section of telson with two spines in each of the posterolateral angles. Epistome subtriangular with a single gentle swelling on each cephalolateral margin. Inner margin of palm of first right pereiopod with a cristiform row of nine tubercles. Chela slightly narrower than in other two races (i.e., proportion of width of hand to length of inner margin of palm). (See Fig. 15.) Opposable margin of movable finger without deep excision in basal half; outer margin with two tubercles along proximal two-fifths. Opposable margin of immovable finger with five tubercles ranging in size (numbering from base) from the largest 3, 5, 2, 4, 1; minute denticles crowded along distal half of same margin interrupted by the two more distal tubercles. Carpus with only two spines on distal portion of inner surface.

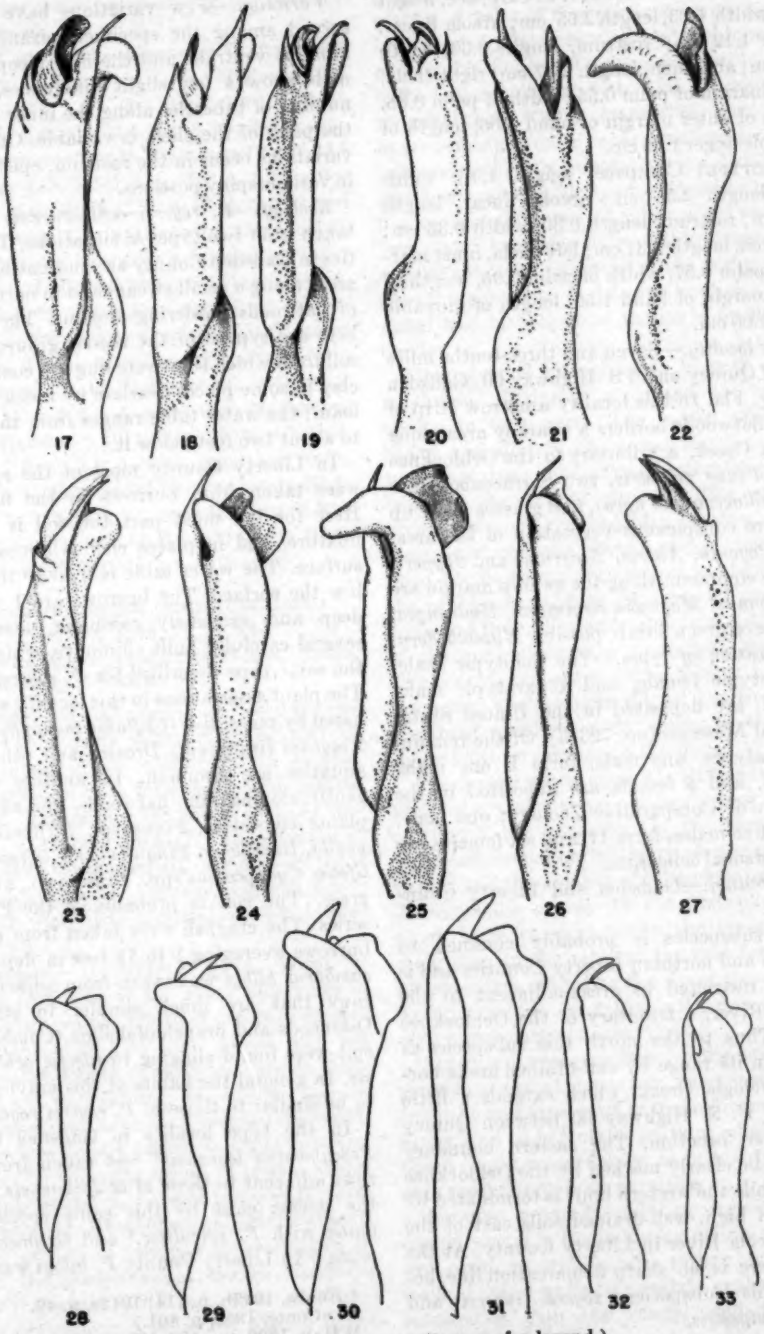
First pleopod extending almost to base of second pereiopod; tip ending in four distinct parts. The mesial process, long and spiniform, is bent caudad and laterad. The cephalic process is a small spiculiform spine partially hidden, particularly in caudal view, by the central projection. It is hidden among the subterminal plumose setae. The caudal process is heavy, noncorneous, somewhat inflated, and is directed mesiodistad. The central projection is a corneous, thin, platelike structure directed obliquely caudolaterad from the cephalodistal surface.

PARATYPIC MALE, FORM II: Differs from the first form male in the usual reduction of spiny and corneous parts. Epistome more elongate than in the first form male. Right rostral ridge not continuous to tip but similar to that of the holotype of *rogersi campestris*.

ALLOTYPIC FEMALE: Differs only in a few minor points from the first form male. Spiny portions reduced. The number of tubercles on the inner margin of the chelae is nine and seven, left and right, respectively. The rostrum is similar to that of the second form male; margins not as decidedly concave.

Annulus ventralis differing from that of *rogersi rogersi* in the following points: Cephalic wall deeply cleft; opening ditchlike with high lateral walls (in some specimens walls overhanging). Lateral walls with a few large rounded tubercles. These walls are directed caudolaterad, and just cephalad of midlength are suddenly bent mesiad and diminish in height to the level of the caudal part of the organ. Across the caudal face of the fossa the wall is somewhat pinched so that it is slightly contorted and folded. In the sinistral caudolateral portion there is an oval mound cut by the caudal portion of the sinus. The general outline is subovate with the greatest length in the longitudinal rather than in the transverse axis as in *rogersi rogersi*.

FIGS. 17–33.—17, Mesial view of first pleopod of male, form I, *Procambarus rogersi rogersi;* 18, mesial view of first pleopod of male, form I, *P. r. campestris;* 19, mesial view of first pleopod of male, form I, *P. r. ochlocknensis;* 20, lateral view of first pleopod of male, form I, *P. r. ochlocknensis;* 21, lateral view of first pleopod of male, form I, *P. r. campestris;* 22, lateral view of first pleopod of male, form I, *P. r. rogersi;* 23, mesial view of first pleopod of male, form I, *P. advena;* 24, caudal view of first pleopod of male, form I, *P. r. campestris;* 25, caudal view of first pleopod of male, form I, *P. r. rogersi;* 26, caudal view of first pleopod of male, form I, *P. r. ochlocknensis;* 27, lateral view of first pleopod of male, form I, *Procambarus advena;* 28–33, caudal views of the first pleopods of males from the region of intergradation (28, Bay County; 29, Gulf County; 30–32, Franklin County; 33, Wakulla County). Pubescence has been removed from all structures figured.



FIGS. 17–33.—(See opposite page for legend.)

Measurements.—HOLOTYPE: Carapace, height 1.25, width 1.23, length 2.65 cm; areola linear, length 1.12 cm; rostrum, length 0.30, width 0.35 cm; abdomen, length 2.37 cm; right chela, inner margin of palm 0.55, width of palm 0.88, length of outer margin of hand 1.56, length of movable finger 1.05 cm.

ALLOTYPE: Carapace, height 1.16, width 1.27, length 2.51 cm; areola linear, length 0.96 cm, rostrum, length 0.30, width 0.35 cm; abdomen, length 2.31 cm; left chela, inner margin of palm 0.57, width of palm 0.95, length of outer margin of hand 1.50, length of movable finger 1.00 cm.

Type locality.—Seven and three-tenths miles west of Quincy on U. S. Highway 90, Gadsden County, Fla. In this locality a narrow strip of grassy flatwoods borders a swampy area along Telogia Creek, a tributary to the Ochlocknee River. *Pinus palustris*, two Sarracenias (perhaps *psittacina* and *flava*), and grasses make up the more conspicuous vegetation of the area, while *Pogonia*, *Aletris*, *Ascyrum*, and *Hypericum* are common. Along the swamp margin are *Cerothamnus*, *Magnolia virginiana*, *Hydrangea*, and an evergreen shrub, possibly *Nyssa biflora*.

Disposition of types.—The holotypic male, the allotypic female, and a paratypic male, form II, are deposited in the United States National Museum (no. 79383). Of the remaining paratypes, one male, form I, one male, form II, and a female are deposited in the Museum of Comparative Zoology; one male, form I, five males, form II, and six females are in my personal collection.

Distribution.—Gadsden and Liberty Counties, Fla.

This subspecies is probably confined to Gadsden and northern Liberty Counties and is perhaps restricted to areas adjacent to the Telogia River, a tributary of the Ochlocknee River. Thus to the north this subspecies is limited in its range by well-drained areas bordering Telogia Creek, which extends a little north of U. S. Highway 90 between Quincy and River Junction. The eastern boundary seems to be clearly marked by the Ochlocknee River, while the western limit is terminated by a strip of high, well-drained soils east of the Apalachicola River in Liberty County. At the south there is no sharp demarcation line between this subspecies, *rogersi rogersi* and *rogersi campestris*.

Variation.—Few variations have been observed among the specimens examined. The annulus ventralis and the first pleopod of the male show a few slight differences, and the number of tubercles along the inner margin of the palm of the chela is variable. Other slight variations occur in the rostrum, epistome, and in various spiny portions.

Ecology.—*P. rogersi ochlocknensis* has been taken from two types of situations. The localities in Gadsden County are fluctuating seepage areas along a small stream and in narrow strips of flatwoods bordering streams. The burrows here are typical of the *rogersi* group, and the soil from which they were dug is a coarse sandy clay in some places overlain by muck or sandy loam; the water table ranges from the surface to about two feet below it.

In Liberty County most of the specimens were taken from burrows in the flatwoods. Here for the most part the soil is a sandy mixture, and in places clay is almost at the surface. The water table is 6 to 18 inches below the surface. The burrows are 1 to 2 feet deep and extremely rambling, many with several carefully built chimneys, which are of the same type described for *P. rogersi rogersi*. The plant associations in this locality are dominated by pines, ti-ti (*Cliftonia monophylla*), and *Ascyrum linifolium; Drosera* and other semiaquatics are common. In another area of gently sloping pine flatwoods, the commoner plants consist of *Pinus* sp., *Cliftonia monophylla*, *Ilex glaber*, *Pinguicula* sp., *Aronia arbutifolia*, *Cyanococcus* spp., *Drosera* sp., and wiregrass. The soil is probably of the Plummer series. The crayfish were taken from complex burrows averaging 1 to 1½ feet in depth. *Procambarus kilbyi* was taken from adjacent burrows that are much simpler in structure. Ostracods and branchiobdellids (*Cambarincola* sp.) were found clinging to *rogersi ochlocknensis*. In general the habits of this crayfish seem to be similar to those of *P. rogersi rogersi*.

In the type locality in Gadsden County *Procambarus leonensis*[8] was taken from burrows adjacent to those of *ochlocknensis*, and in the stream close by this same species was, along with *P. spiculifer*,[9] and *Orconectes clypeata*.[10] In Liberty County *P. kilbyi* was taken

[8] Hobbs, 1942b, p. 114; 1942c, p. 49.
[9] LeConte, 1856, p. 401.
[10] Hay, 1899, pp. 122–123.

from burrows interspaced among the burrows of *ochlocknensis*.

Material examined.—GADSDEN COUNTY: 7.3 miles west of Quincy [U. S. Highway 90] (4-1437-1, 1 ♂I, 1 ♀), (3-1739-3, 1 ♀), (5-141-1a, 2 ♂ ♂I, 2 ♂ ♂II, 2 ♀ ♀); 8.3 miles southwest of junction of State Highways 12 and 135 on Highway 135 (5-141-3, 1 ♂I, 1 ♀); 2.7 miles southwest of junction of U. S. Highway 90 and State Highway 12 on Highway 12 (5-141-2, 1 ♂II). LIBERTY COUNTY: 4.5 miles north of Hosford [State Highway 135] (5-141-5, 3 ♂ ♂II, 3 ♀ ♀). The remaining specimens from following localities are slightly atypical: Near Hosford (12-937-1a, 1 ♂I); 1.6 miles west of the Ochlocknee River [State Highway 19] (3-1639-1a, 1 ♂I, 1 ♂II, 8 ♀ ♀); 4 miles east of Hosford [State Highway 19] (3-1739-1a, 2 ♂ ♂I, 2 ♂ ♂II, 7 ♀ ♀, 2 ♀ ♀ with eggs, 1 ♂ imm., 1 ♀ imm.); 9 miles west of Hosford [State Highway 19] (3-1739-8a, 1 ♀); near Hosford (8-234-1, 1 ♀); 3.5 miles east of Hosford [State Highway 19] (4-841-1, 2 ♂ ♂II, 1 ♀ with eggs).

Procambarus rogersi campestris Hobbs

Figs. 3, 4, 7, 16, 18, 21, 24

Procambarus rogersi campestris Hobbs, 1942b, p. 90, pl. 6, figs. 81–85, map 5.

Diagnosis.—Hooks present on ischiopodites of third pereiopods only; rostrum without lateral spines; areola obliterated in middle. First pleopod of first form male with fanlike central projection directed across cephalic surface; caudal process thumblike and directed at a 45° angle to the main shaft. Annulus ventralis subcylindrical with cephalic border open; troughlike with high, multituberculate lateral ridges.

Description.—HOLOTYPIC MALE, FORM I: Differing from one or the other subspecies in the following points: Width of carapace greater than height (1.65:1.45 cm). Areola 40.9 per cent of entire length of carapace. Areola obliterated; no punctations in fusion line of branchiostegites. Subrostral ridges prominent; rostral ridges do not extend to tip of rostrum. (See Fig. 7.) Cephalic region in lateral aspect not evenly rounded. Lateral surfaces of carapace granulate. Branchiostegal spines absent. Anterior section of telson with two spines in each of the posterolateral angles. Epistome broadly subovate with an acute cephalomedian projection. Antennules with a spine present on ventral side of basal segments. Inner margin of palm of first pereiopod with a cristiform row of nine tubercles. Opposable margin of movable finger with deep excision in basal half. Outer margin with five tubercles on proximal half. Outer margin of immovable finger bearing a row of tubercles along proximal half and setiferous punctations on distal half. The one major tubercle on opposable margin lies somewhat distad of midway between the two major tubercles on movable finger. Two smaller tubercles proximad of the major tubercle. A single row of minute denticles along distal half is broken at intervals by five tubercles.

First pleopod extending to base of second pereiopod, distinctly separated at tip; tip ending in four parts. The mesial process is heavy and sinuate (in mesial view), tapering to a point; bent obliquely and laterally, passing beneath the caudal process. The cephalic process is much reduced (can be seen only in mesial and cephalic views), and is closely applied to the central projection at the base of the cephalomesial face. The caudal process is large and thumblike and extends at a 45° angle to the main shaft in a mesiodistal direction. The central projection forms a large corneous fan across the cephalic side of the tip and is also bent at about a 45° angle to the main shaft; however, directed laterodistad.

PARATYPIC MALE, FORM II: Differs from the first form male in only a few minor details, chiefly in the reduction of the sexual and secondary sexual parts (there being no corneous parts), and the number of tubercles and spines. The cephalic process of the first pleopod is much more conspicuous in the second form male than in the male of the first form. The rostral ridges extend to the tip of the acumen. Anterior section of telson with one spine in each posterolateral angle.

ALLOTYPIC FEMALE: Besides the sexual and secondary sexual characters, the female differs from the first form male in the following points: Spiny and tuberculate portions slightly different; right rostral ridge as in holotype; left as in second form male paratype.

Annulus ventralis differing from that of *rogersi rogersi* in the following points: Cephalic wall open, troughlike, with rather high lateral walls. Lateral walls tuberculate cephalad, and continuous with the caudal wall which is

lower, decidedly lower left of the midventral line. Whereas the annulus of *rogersi rogersi* is subovate and broader than long, the annulus of *rogersi campestris* is subcylindrical.

Measurements.—HOLOTYPE: Carapace, height 1.45, width 1.65, length 3.15 cm; areola linear, length 1.29 cm; rostrum, length 0.40, width 0.39 cm; abdomen, length 2.90 cm; right chela, inner margin of palm 0.74, width of palm 1.28, length of outer margin of hand 2.19, length of movable finger 1.46 cm. ALLOTYPE: Carapace, height 1.35, width 1.54, length 3.02 cm; areola, linear, length 1.15 cm; rostrum, length 0.36, width 0.39 cm; abdomen, length 2.90 cm; right chela, inner margin of palm 0.65, width of palm 1.12, length of outer margin of hand 1.97, length of movable finger 1.34 cm.

Type locality.—A low, pine flatwoods about 12 miles south of Tallahassee, Leon County, Fla., along the east side of Horseshoe Bay (the exact location: Sec. 16–17, T. 25, R. 2 W.). This locality is a typical sour-gum and ti-ti bay region. The hammock is quite low, with very acid soil and water, and is subject to flooding in wet weather. The soil is largely muck and sand, and at the time of digging the water table was about 3 feet below the surface. Pines, wiregrass, palmetto, gallberry, and ti-ti shrubs are characteristic of the flora, and pitcherplants and sundews are common.

Disposition of types.—The holotypic male, form I, the allotypic female, and a form II male paratype are deposited in the United States National Museum (no. 79384). Two female paratypes are in the Museum of Comparative Zoology. The remaining paratypes, one male, form I, one male, form II, and 13 females are in my personal collection.

Distribution.—Leon and Wakulla Counties.

The typical forms of *P. rogersi campestris* are found in the southwestern part of Leon and northwestern part of Wakulla Counties. This subspecies is also a Florida endemic and probably occupies the greater portion of the western half of Wakulla and the southwestern quarter of Leon Counties.

The range of *campestris* is bounded on the west by the Ochlocknee River, which, together with the well-drained soils adjacent to it, serves as an effective barrier in Leon and the northern part of Wakulla Counties but is only a partial barrier in the southern part of Wakulla County; the eastern boundary is a region of high, well-drained soils extending through the middle of Wakulla County to the Gulf. The northern boundary lies in the southwestern part of Leon County where the flatwoods end in well-drained, rolling hills.

Variation.—There is no indication of inbred local populations among my specimens of *P. rogersi campestris;* the only differences observed seem to be individual ones, involving sizes and positions of spines and tubercles.

Ecology.—Like the other members of this species, *rogersi campestris* is a primary burrower, apparently confined to flatwoods. The flatwoods east of the Ochlocknee River are not markedly different from those described in the discussion of the ecology of *P. rogersi rogersi*, except that the soil is underlain by hardpan rather than clay. There are pines, wiregrass, pitcherplants, sundews, etc., and the soil is much the same general type—that is, most of it is poorly drained and supports an abundant growth of semiaquatic plants.

The burrows are very complex and often run horizontally for several feet; many of them reach the surface in several places. On one occasion I dug into one of these burrows and followed the spiral passage downward for 5 feet and still had not reached the bottom. This burrow was about a hundred yards from the border of a bayhead, and its unusual depth was probably explained by the fact that just prior to the time I collected here there had been an unusually long dry season.

Several specimens of *Crangonyx* sp. were taken from the burrows, some of them clinging to the abdomens of the crayfish. Many ostracods and branchiobdellid worms (*Cambarincola vitrea* Ellis) were found clinging to the crayfish.

In only two instances has another species been collected with *rogersi campestris*. *P. kilbyi* was taken from burrows adjacent to those of *campestris*. The burrows of the two species, however, are very distinct in that those of *kilbyi* are generally simple, while those of *campestris* are very complex.

Material examined.—LEON COUNTY: 12 miles southwest of Tallahassee (11-2736-1, 2 ♂ ♂I, 2 ♂ ♂II, 10 ♀ ♀). WAKULLA COUNTY[11]: 28

[11] Perhaps some of the locality records from Wakulla County should be listed under the intergrade localities, although most of the specimens taken here are scarcely to be distinguished from typical *campestris*.

miles north of Sopchoppy [State Highway 127] (6-538-6, 1 ♂I); 2 miles south of Sopchoppy [U. S. Highway 319] (5-2940-8, 1 ♂II, 4 ♀ ♀, 2 ♀ ♀ imm.); 7.5 miles northwest of Sopchoppy [State Highway 127] (6-538-8b, 1 ♀); 7 miles north of Sopchoppy [State Highway 127] (6-538-9, 1 ♂II); 16 miles southwest of Tallahassee (8-0436-2, 6 ♀ ♀).

INTERGRADES

The characters in which the evidences of intergradation are most clearly seen are the structure of the first pleopod of the male and of the annulus ventralis of the female. The variations in these structures are gradual and essentially quantitative rather than discontinuous ones. In the male there is, from one extremity of the range to the other, a gradual change in the degree of bending of certain of the terminal processes and in the relative sizes of the various tips. (See Figs. 1, 4, 10, 13, and 17–33.) For example, the caudal process of the first pleopod of the males from Calhoun County (*rogersi*) is bent laterad at a right angle to the main shaft of the appendage. In specimens from Gulf and Franklin Counties, west of the Apalachicola River (intergrades), the process, while bent, forms less than a right angle with the main shaft. Specimens from Franklin County east of the Apalachicola River and from southern Liberty County (intergrades) have this process even more erect, and finally, in material from Wakulla and Leon Counties (*campestris*), and from northern Liberty and Gadsden Counties (*ochlocknensis*), the process is still more nearly straight. In the region of intergradation occasional specimens occur which are structurally out of place, but considering the series as a whole the gradation is quite evident.

Similarly the annulus ventralis shows gradual changes in gross shape, in configuration of the fossa and sinus, and in surface contour. (See Figs. 2, 3, 5, 6, 8, 9, 11, and 12.) In specimens from Calhoun County (*rogersi*) this structure is subelliptical, with the longest axis directed laterad and with only a few very small tubercles on the cephalic border, which is entire. In specimens from west of the Apalachicola River in Bay and Gulf Counties (intergrades) the annulus is broader than long, but this characteristic is not so marked as in the Calhoun County females; the tubercles on the cephalic border are also more strongly developed. In specimens from east of the Apalachicola in Franklin and Liberty Counties (intergrades) the annulus ventralis is more elongate and the tubercles decidedly higher. The opposite extreme from the annulus ventralis of the Calhoun County specimens is seen in the females from Gadsden County (*ochlocknensis*). Here it is much longer than broad, the cephalic margins strongly tuberculate and cleft. The *campestris* population in Wakulla and Leon Counties has the annulus ventralis more like the Franklin County intergrades.

Additional similarly merging variations may be noted in the figures of these structures. While there are other differences between the three geographic races, they do not show so clearly the gradual blending exhibited by the first pleopod of the male and the annulus ventralis of the female.

As shown by the accompanying map, the area inhabited by the intergrades is larger than the combined ranges of the three defined races, and extends considerably to the west along the coast. That the population of this area does not itself constitute a recognizable race distinct from the others, as might be suspected on geographical grounds, becomes evident when the variation described above is further analyzed. In western Franklin County the crayfish are most nearly intermediate in characteristics between *r. rogersi*, *r. campestris*, and *r. ochlocknensis*, and at the same time are the most heterogeneous, showing the most variable admixtures of the characters of the three races. The farther east one goes in Franklin and southern Wakulla Counties the more nearly does the population approach *campestris*, while in northern Franklin and southern Liberty counties a similar approach occurs to typical *ochlocknensis*. Just west of the Apalachicola River the population is still highly variable, but shows a tendency toward *rogersi*, and probably intergrades fully with that race in the north-central part of Gulf County. Farther west the population is still heterogeneous, though closer to *rogersi* than to either of the more eastern races; however, it can not even be called atypical *rogersi*, since features suggesting *campestris* and *ochlocknensis*, which are never present in typical *rogersi*, occur in individual specimens.

Two rather startling situations involving

specimens from local areas in Bay County deserve further remarks. One of these peculiar situations arises in the peninsula, herein designated as the San Blas Peninsula, between East Bay and the Gulf. The first pleopods of the males taken in this peninsula are almost typical of *rogersi rogersi* from Calhoun County, while the annulus ventralis in the females is not nearly so typical—being similar to that of the intergrades found in other sections of Bay County and in Gulf County. This condition is peculiar, since both males and females from the mainland to the north and east are definitely of the intergrade types. Perhaps an explanation for this apparently local condition may be made by the further assumption that *rogersi rogersi* had already become differentiated by the end of the Pamlico submergence, and as the land emerged to the south, this species followed the retreating shore line, moving out into the area now constituting the San Blas Peninsula. Subsequent influx of the *ochlocknensis* and the *campestris* stocks from the east resulted in the intergradation (hybridization) of these stocks in Gulf and Bay counties, but at the same time establishing two semi-isolated areas of *rogersi rogersi*—one in Calhoun County, the range of typical *rogersi*, and the other in the San Blas Peninsula, the later perhaps being more subject to intergradation than the former because of its geographical and less well isolated position.

The other region that needs further remarks is the one seemingly isolated on the west side of West Bay. I have only three specimens from the West Bay region, a male, form I, taken 1.5 miles north of West Bay, and two females collected about 1 mile south of it. The pleopod of the male very closely approximates that of *rogersi campestris*, but the annuli ventralis, the rostra, and chelae are not typical of any of the subspecies. It has been supposed that there was a continuous area occupied by *rogersi* across the northern shore of both East and West Bay, but recently in attempting to collect this species in this area I drove north along State Highway 52 through the flatwoods section and west from Vicksburg to West Bay on State Highway 83 and was unable to locate a single *rogersi* burrow. This, of course, does not indicate the absence of *rogersi* in the area, but the fact that I did not find it there at least opens the question as to what path of migration the stock took to reach the western shore of West Bay. This might lead one to wonder whether or not the San Blas Peninsula and the adjacent peninsula to the west were at one time connected.

The coastal area of intergradation appears, therefore, to be a zone in which tendencies characteristic of all three races are complexly intermingled. Whether the three named races have arisen through isolation from this stock of intergrades or whether the intergrading coastal population represents later mingling of three stocks that had earlier attained morphological separation is a question. Evidence to be cited below suggests that the latter is the more likely hypothesis.

There is little doubt that the *rogersi* stock was derived from the primitive *advena* stock, and it seems likely that *r. ochlocknensis* is the most primitive form of the complex. The first pleopod as well as the other morphological characters of *r. ochlocknensis* are very similar to those of *P. advena* of southwest-central Georgia. Further evidence to support the supposition that the *rogersi* complex was derived from an ancestral *advena* stock lies in the fact that *advena* occurs in the region of the headwaters of the Ochlocknee, and *r. ochlocknensis* seems to be almost confined to its drainage system in Liberty and Gadsden Counties, Florida. From this stock the two other well-defined races probably arose through isolation, and the variable coastal population of intergrades has probably arisen through later mingling of these once isolated groups. Such a history of isolation followed by remingling may be related to what is known of the geological history of this part of Florida during the Pleistocene.

According to C. Wythe Cooke (1939) in his recent study of the Pleistocene terraces of Florida, Florida was even more emergent during the interval between the Talbot and Pamlico stages than it is today. At this time it would have been possible for the ancestral *ochlocknensis* stock to have entered the present territories occupied by *rogersi* and *campestris* by way of the flat lands bordering the Gulf. This period was followed by the Pamlico submergence, which pushed the coastline well inland, and may well have been the isolating factor responsible for the differentiation of the three races, which were then separated by well-

marked barriers on all sides. The emergence of recent times, with the reestablishment of broad areas of coastal flatwoods suitable for occupancy by the members of the *rogersi* complex, would then account for the remingling of the stocks and the production of the coastal "intergrades" discussed above.

Under present conditions it is evident that the Ochlocknee and Apalachicola Rivers are at least partial barriers to the dispersal of these crayfishes, particularly where there are belts of well-drained soils along their eastern banks. Where such soils intervene there is no evidence of intergradation across these barriers even where the ranges are quite close together. To the south, however, where suitable habitats exist on either side of the rivers, the streams themselves evidently still act as partial barriers, since there is a definite change in the characteristics of the intergrade populations at the rivers.

Material examined.—My evidence of intergradation of the three subspecies of *Procambarus rogersi* is based on approximately 220 specimens collected in Calhoun, Gulf, Bay, Franklin, Wakulla, Gadsden, and Leon Counties, Fla. This listing constitutes a detailed record of the distribution of the intergrades.

BAY COUNTY: 18 miles west of Port St. Joe [U. S. Highway 98] (6-638-8a, 1 ♂II); 17 miles west of Panama City [State Highway 10] (6-638-9b, 1 ♀); 20.6 miles east of Panama City [U. S. Highway 98] (5-3040-7a, 1 ♂II, 2 ♀ ♀); 6.3 miles west of Beacon Hill [U. S. Highway 98] (5-341-2, 2 ♂ ♂I, 2 ♂ ♂II, 1 ♀ with eggs); 12 miles west of Beacon Hill [U. S. Highway 98] (5-341-4a, 1 ♂II); 16.8 miles west of Beacon Hill [U. S. Highway 98] (5-341-5a, 1 ♂I, 1 ♀ with eggs); 5.3 miles southeast of Panama City [U. S. Highway 98] (5-341-6, 4 ♀ ♀, 1 ♀ with eggs); 0.7 miles north of Panama City [State Highway 52] (5-341-7a, 2 ♀ ♀); 2.4 miles north of Panama City [State Highway 52] (5-341-8, 1 ♀, 1 ♀ with eggs); 3 miles east of Panama City [State Highway 52] (5-341-12, 2 ♀ ♀); 7.8 miles east of Panama City [State Highway 52] (5-341-13a, 1 ♀); 13.1 miles east of Panama City [State Highway 52] (5-341-14a, 2 ♂ ♂I, 1 ♂II, 2 ♀ ♀); 1 mile south of West Bay [State Highway 10] (10-1641-6a, 1 ♂I)[12]; 1.5 miles north of West Bay [State Highway 10] (10-1641-7, 1 ♀). FRANKLIN COUNTY: Franklin-Wakulla County line [U. S. Highway 319] (6-538-11, 1 ♂II, 1 ♀); 6.9 miles west of Carrabelle [U. S. Highway 319] (6-638-2a, 2 ♂ ♂II, 3 ♀ ♀, 1 ♀ with young); 9.9 miles west of Carrabelle [U. S. Highway 319] (6-638-3, 1 ♂II, 1 ♀); 3.3 miles west of Apalachicola [U. S. Highway 98] (6-638-4, 1 ♂II, 3 ♀ ♀, 1 ♀ immature); 3.8 miles west of Apalachicola [U. S. Highway 98] (6-638-6, 1 ♂II); 23.3 miles east of Port St. Joe [U. S. Highway 98] (5-3040-4a, 2 ♀ ♀); 5 miles west of Carrabelle [U. S. Highway 319] (5-3040-1, 3 ♂ ♂II, 3 ♀ ♀); 12 miles west of Carrabelle [U. S. Highway 319] (5-3040-2, 2 ♀ ♀); 4.2 miles west of Apalachicola [U. S. Highway 98] (5-3040-3, 1 ♀); 1.9 miles south of Sumatra [State Highway 12] (5-241-8, 3 ♂ ♂I, 2 ♀ ♀); 8.4 miles south of Sumatra [State Highway 12] (5-241-10a, 1 ♀ with eggs); 15.1 miles southeast of Sumatra [State Highway 12] (5-241-11a, 1 ♀); 20.9 miles southeast of Sumatra [State Highway 12] (5-241-12, 1 ♂II); 25.5 miles south of Sumatra [State Highway 12] (5-241-13, 1 ♀); Intersection of State Highway 12 and U. S. Highway 319 (5-241-14a, 3 ♂ ♂I, 1 ♂II, 3 ♀ ♀); 3 miles southwest of intersection of State Highway 12 and U. S. Highway 319 (5-241-15, 1 ♀); 2.3 miles west of Apalachicola [U. S. Highway 98] (5-241-16, 1 ♂I, 2 ♂ ♂II, 1 ♀); 6.9 miles west of Apalachicola [U. S. Highway 98] (5-241-17a, 2 ♂ ♂II); 11.5 miles west of Apalachicola [U. S. Highway 98] (5-241-18, 1 ♂imm., 1 ♀ with eggs). GULF COUNTY: 5.6 miles north of Port St. Joe [State Highway 6] (4-738-4, 1 ♂II, 1 ♀); 0.5 mile west of Wewahitchka [State Highway 52] (5-341-15, 1 ♂I); 17.6 miles west of Apalachicola [U. S. Highway 98] (5-241-19, 1 ♂II, 1 ♀). LIBERTY COUNTY: Vilas (9-1835-1, 1 ♂II, 2 ♀ ♀); 2.6 miles south of Hosford [State Highway 135] (5-141-6, 2 ♂ ♂II, 1 ♀); 4.8 miles south of Telogia [State Highway 135] (5-241-1a, 1 ♂I, 1 ♂II, 1 ♀); 12 miles south of Telogia [State Highway 135] (5-241-4, 2 ♂ ♂II, 1 ♀); 2.6 miles southeast of Wilma [State Highway 135] (5-241-5a, 1 ♂II, 2 ♀ ♀); 6.9 miles southeast of Wilma [State Highway 135] (5-241-6a, 1 ♂I, 1 ♂II); 12.1 miles south of Wilma [State Highway 135] (5-241-7a 2 ♀ ♀).

[12] This was a second form male when caught on October 16, 1941, and molted to first form on December 20, 1941.

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NOTE

This paper was originally accepted for publication in the Proceedings of the United States National Museum, and it was cited as "in press" in my *Crayfishes of Florida* (Hobbs, 1942). Wartime restrictions, however, so delayed publication by the Museum that the manuscript was withdrawn and submitted to this JOURNAL in order that the full descriptions of the two new subspecies of *Procambarus rogersi* might appear more promptly.

I wish to acknowledge the invaluable aid of the following persons who have contributed to my work on this paper, both through help in procuring specimens and in preparation of the manuscript and figures: Dr. Waldo L. Schmitt, Profs. J. S. Rogers and T. H. Hubbell, Drs. Lewis Berner, F. N. Young, and A. M. Laessle, and Messrs. Lewis Marchand and W. L. Brudon. Dr. C. J. Goodnight kindly identified the branchiobdellids for me.

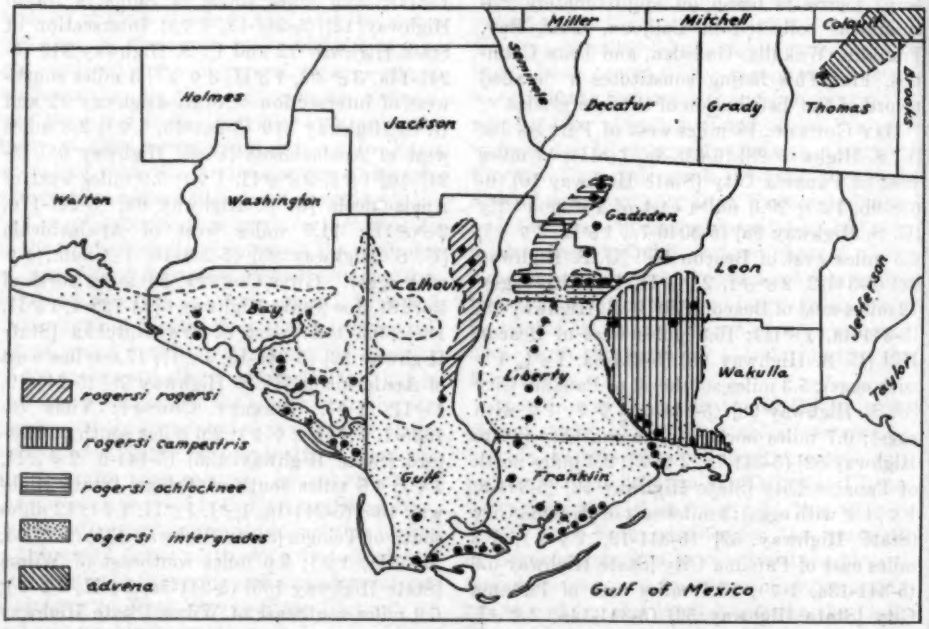

FIG. 34.—Distribution of *Procambarus rogersi* in Florida. The shaded areas indicate the extent of coastal flatwoods or low areas along streams, which seem to be available to the *rogersi* stock. The two localities lying outside of these areas in Gadsden and Liberty Counties are situated along streams that drain into the Telogia River system, thence into the Ochlocknee. The black spots represent the localities at which specimens were collected.

ZOOLOGY.—*Two new leeches (Hirudinea) in the collection of the United States National Museum.*[1] J. PERCY MOORE, University of Pennsylvania. (Communicated by WALDO L. SCHMITT.)

The two leeches herein described are among lots submitted through the interest and kindness of Dr. Waldo L. Schmitt from the collections of the U. S. National Museum. The first, from Mexico, is of exceptional interest. The other species occurs in China and Burma.

Genus **Diestecostoma** Vaillant

Diestecostoma magna, n. sp.

Figs. 1–3

Material examined.—Type, U.S.N.M. no. 20642, Río de los Playas, head waters of Tonalá River between Veracruz and Chiapas, March 1–8, 1944, collected by M. W. Stirling; paratype, labeled "Tehuantepec," collected by F. E. Sumichrast.[2]

Diagnosis.—Size large and form robust with external characters of the genus. Eyes probably normally four pairs on somites III to VI (annuli 3, 4–5, 6, and 9). Total number of annuli (not counting prostomium) 200 or 201. Complete somites 12-annulate, all annuli of nearly equal size. I, II, III each 1-annulate, IV and V 2-annulate, VI 3-annulate, VII 4-annulate, VIII 7 or 8-annulate, IX and X 8-annulate, XI and XII 9-annulate, XIII 10- or 9-annulate XIV 11-annulate, XV–XXII 12-annulate, XXIII probably 10-annulate but may be 12-annulate, XXIV–XXVII together of 19 or 17 annuli. Male pore XI *b4/c9* (ann. 42/43 or 43/44), female pore XIII *c9/c10* (ann. 62/63), separated by 20 or 19 annuli. Anus 194/195 followed by 5 or 6 postanal annuli. Nephropores not seen on VIII or IX, 14 pairs on X to XXIII, first four separated by 9 annuli, fourth and fifth by 10, and the next nine by 12 annuli; last pair (seventeenth) united in a median ventral pore behind ann. 195. Color uniform dark slate above, paler below. Black in life (M. W. Stirling).

The three known species of the genus, namely, *D. octannulata*, *D. mexicana*, and *D. magna*, have complete somites respectively of 8, 10, and 12 annuli. Customarily this would promote generic separation, but in this case nothing would be gained thereby.

Description of type.—A stout leech (Fig. 1) of very firm texture and thick, muscular body walls; cylindroid throughout, little depressed but with venter somewhat flattened, tapered at the ends; in general shaped much like an earthworm and evidently adapted for burrowing. Measurements in millimeters: length 103, to male pore 19; widths, buccal ring 3.5, male 8.5, maximum (XIII, XXI) 10.3, anus *ca.* 9; depths at same points, 2.3, 7, 7, *ca* 5; sucker diameter 6.7. Head region small; lip partially retracted into mouth but when drawn out arched and as seen from below rather wedge-shaped; its dorsum distinctly annulated and areolated; constituted of a prostomial apical lobe not separated by a distinct furrow from the first annulus which forms somite I, following which are four annuli constituting somites II, III, and IV. Venter of lip with margins converging into the buccal chamber, divided by a deep median sulcus and three pairs of shallower furrows into eight flat, smooth ridges. Peristomium or buccal ring formed by the union ventrally of the two annuli (6 and 7) of V, deeply crenate on the margin and with slightly extended small lateral lobes which partially embrace the lateral ends of somite IV. Eyes (Fig. 2) small, not forming a regular arch, the four pairs of distinct pigment cups in two groups on somites III and IV (annuli 3 and 4–5), and V (annulus 6) and VI (annulus 9); besides these are two minute pigment spots, one on the right side of II cephalad of the first definitive eye and the other on VI *a2* mediad of the last right eye. Clitellar region somewhat thickened and at the anterior end of XIII forming one of the widest parts of the body, but its limits not defined externally. Male pore a minute opening in the furrow XI *b4/c9*,

[1] Received March 15, 1945.

[2] In his day Dr. Sumichrast was one of the most valued correspondents of the Smithsonian Institution. For many years he occupied himself with a close and critical study of the natural history of Mexico, and he collected there for the Institution from 1868 to 1876, giving special attention to the Isthmus of Tehuantepec, collecting principally in the states of Veracruz, Oaxaca, and Chiapas, as well as Mexico and Puebla. As Dr. Sumichrast's notebooks seem no longer to be available, it is not now possible to say where the paratype was actually collected.

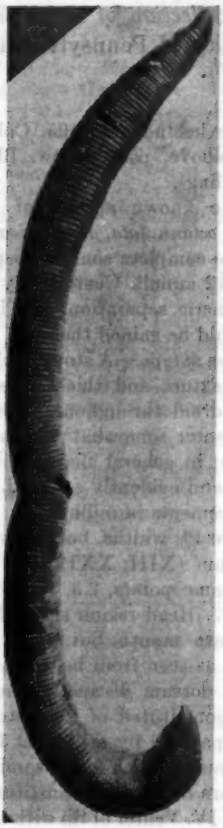

FIG. 1.—*Diestecostoma magna*, n. sp., right lateral aspect of type; ×1½.

that is, between the fifth and sixth annuli of the somite or the total number of annuli 42/43; female pore at XIII *c8/c9* (annuli 62/63) or 20 annuli caudad of the male, a large orifice cutting into *c8*, which is somewhat reduced and at this point coalesced with *c7*. Anus a large opening with furrowed margins far forward (as in the Erpobdellidae) between annuli 194/195 (counted on left side or 192/193 on right) into which it cuts. Postanal annuli 6, making the total 201. Caudal sucker relatively small, directed ventrad, with a broad peduncle as in *Erpobdella;* the dorsum areolated as on the body in five irregular transverse rows; venter slightly cupped, finely granulated, more coarsely toward the periphery where the margin is thick and crenulate, no radiating ridges or furrows. Nephropores, 15 pairs actually seen, the last belonging to somite XXIV carried caudad to the ventral face of the sucker peduncle, where they are united in a large median pore behind annulus 195, the last annulus developed on the venter. Fourteen pairs are conspicuous pores situated on the caudal border in the ventral intermediate line of *b2* or the equivalent *c4* of every somite from X to XXIII inclusive, that is, on annuli numbered 31, 40, 49, 58, 68, 80, 92, 104, 116, 128, 140, 152, 164 (on left, 163 right), 176 (on left, 174 on right). On somite VIII there is no trace of nephropores, and on IX, while there are small notches at the points where they would be expected, no actual pores were detected. Probably they are transferred to the buccal ring as in *D. mexicana* (Baird), but this can be definitely determined only by means of sections. *Annulation* strongly developed, the furrows deep and on complete somites usually alternately deeper so that the annuli appear grouped in couples, presumably each of two tertiary annuli, but there is some irregularity. Each annulus divided on its dorsal half into usually 24 (up to 28) more or less quadrate areas which are prominently convex, resulting in a conspicuously pebbled surface, finely roughened by numerous minute sensory papillae mostly aggregated in a central group which becomes more elevated on annuli toward the caudal end. Areolae often arranged more or less regularly in longitudinal series continuing over several annuli but oftener staggered and interlocking, especially in the median field. Metameric sensillae not distinguished. On the shorter span of ventral half-annuli an equal number of smaller, smoother, flatter areas. With only the eyes on the head and the nephropores in the middle body region to serve as metameric criteria, the following is a tentative determination of the probable composition of the somites: I, which is scarcely separated from the prostomium, II and II each uniannulate; IV incompletely and V fully biannulate, the latter united ventrally to form the buccal ring; VI 3-annulate (8–10) complete both dorsally and ventrally. Four pairs of eyes on III to VI, a minute supplementary eye on the right side of II and one on VI. VII 4-annulate (11–14), *a1* slightly > *a2* = *b5* = *b6*. VIII 7-annulate (15–21) probably *b3* = *b4* = *b5* slightly > *b1* = *b2* = *c11* = *c12*. IX 8-annulate (22–29) *b1* to *b4* > *c9* to *c12*, in four pairs, possible nephropores on *b2*

(23). X 8-annulate (30–37), like IX but with first certain nephropores on *b2* (31). XI 9-annulate (38–46), three larger annuli in middle preceded by two and followed by four small ones, *b2* = *b3* = *b4* > *c1* = *c2* = *c9* to *c12*; nephropore *b2* (40), male pore *b4/c9* (42/43). XII 9-annulate (47–55) like XI but no male pore, nephropore *b2* (49). XIII 10-annulate (56–65) like XII except that *b4* is apparently divided into *c7* and *c8* making two slightly larger preceded by two and followed by six smaller annuli; female pore *c8/c9* (62/63), nephropore *b2* (58). XIV doubtfully 11-annulate (66–76) all tertiaries but *b2*, the third annulus; nephropore *b2* (68). XV–XXI (77–160) each 12-annulate with all tertiaries (*c1–c12*) developed and more or less distinctly arranged in pairs, nephropores on the fourth annulus, *c4* (every 12th annulus from 80 to 152). XXII 12-annulate (161–172) similar to foregoing except that owing to split, spiral, and conjoined annuli, especially in the region of *a1*, two large annuli on the right side replace four small ones on the left, resulting in asymmetry and a discrepancy in the count on the two sides for the remainder of the length; nephropore on left side normal, on fourth annulus (164), on right side far forward in the large third annulus (163). XXIII probably 10-annuate (173–182 left, 171–180 right), nephropore on fourth annulus (*c4* 176 or 174). Caudad of XXIII, counted as 10-annulate, are 19 annuli which constitute somites XXIV to XXVII inclusive, but there are no external criteria for determining their limits. Some annuli in the anal region are much larger dorsally and taper to little or behind 195 to nothing ventrally but this is due to the strong curvature ventrad. Color as preserved uniform dark slate above, paler below; according to Mr. Stirling black in life.

Description of the paratype.—The paratype was collected by Dr. Sumichrast (see footnote, page 261). When living it was probably almost as large as the type, but now it is more contracted and artificially more flattened and somewhat distorted. It measures in millimeters: length 78.2, to male pore 16; widths, buccal 2.5, male 7.5, maximum (middle of length) 12.2, anus 7.2, depths at same points 2.5, 6.5, 8.6, 4.5; diameter of sucker 6. Annulation and other characters agree with the type, but the areolation is largely smoothed out as a result of softening and abrasion of the surface due to long preservation. There are some minor differences. Eyes four pairs, arranged as in the type on somites III to VI, none detected on II and no supplementary eyes on VI. Male pore at XI *b4/c9* (annuli 43/44), the additional annulus being due to an extra pregenital one, apparently in VIII, which appears to have eight instead of seven as on the type, but this is compensated on XIII which is 9- instead of 10-annulate, with female pore at 62/63 (probably *b4/c9*) 19 annuli behind the male. Both genital pores are relaxed and large. Nephropores are

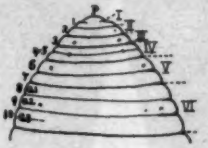

FIG. 2.—*D. magna:* type, segmentation of cephalic region from dorsum, semidiagrammatic; annuli numbered on left, somites on right side; *P*, prostomial lobe; ×5.

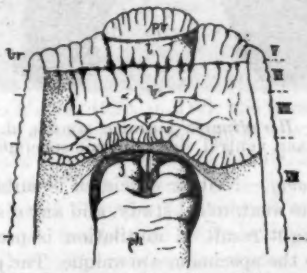

FIG. 3.—*D. magna*, dissection of buccopharyngial region of paratype, from the venter; *b*, buccal chamber laid open; *br*, buccal ring; *j*, right lateral jaw; *l*, lip; *p*, dorsal papilla; *ph*, pharynx; *pr*, prostomium; *v*, velum; somites numbered in Roman; ×6.

spaced exactly as on the type. None found on VIII and very doubtfully on IX but from X to XXIII they are evident, the first four being each separated by nine annuli, the fourth and fifth by 10, and the remaining nine pairs by 12 annuli, the last pair belonging to XXIV being united in a median opening at the base of the sucker. Anus at 194/195 followed by five annuli, making the total number 200. Owing to strong contraction the annuli for the most part are very narrow and crowded but on the dorsum are distinct and easily counted. In places, however, they are unequally contracted, and on the venter of the clitellar region are much split and interconnected.

FIG. 4.—*Hirudinaria javanica similis*, n. subsp., dorsal and ventral views of type specimen; ×2.

Anatomy.—Neither specimen is suitable for complete anatomical study, and any dissection that might result in mutilation is prohibited because the specimens are unique. The pharyngobuccal region of the cotype was cautiously opened (Fig. 3), bringing to light conditions quite like those described by Cabellero (1940) for his *Hygrobdella pelaezi* = *Diestecostoma mexicana* (Baird, 1869) and in a forthcoming paper by the writer to be published by the Bishop Museum. The buccal chamber is spacious (Fig. 3*b*) and extends to the end of somite VII, where it is bounded by the velum (*v*). The inner surface is marked by a circular furrow, which delimits the buccal ring internally, and in its cephalic part by longitudinal furrows, some of which are continuations of those on the ventral face of the lip. These fade out in the caudal half where they are replaced by a few irregular, more or less branched wrinkles. The velum (*v*) is a prominent curtainlike diaphragm with deeply scalloped border forming the boundary between the buccal and pharyngeal chambers at VII/VIII. Immediately cephalad of it in the dorsomedian line is a soft triangular papilla (*p*) terminated by a short filiform process. The pharynx (*ph*) is a muscular organ lying in somite VIII and partly in IX. The cephalic end terminated by three lobes projects freely into an introverted pharyngeal chamber lined by a thin flexible membrane and obviously capable of limited protrusion somewhat as in the rhynchobdellid leeches but much less, although much more than in haemadipsines which show some approach to this condition. The three pharyngeal lobes are median dorsal and right and left ventral and each bears a small but prominent toothed jaw (*j*). Each jaw bears on a median ridge a series of teeth the form and number of which were not ascertained. On the type two ganglia of the ventral chain in complete somites XVII and XVIII were exposed through a cut that had been conveniently made at the time of collection. Relatively to the size of the leech they are small. As they lie in the two annuli immediately succeeding that on which the nephropores open they agree with the latter in fixing the position of the primary *a1* and *a2* components of complete somites. This, however, while helpful, does not certainly fix the limits of the somites which was done for the middle body region on the additional evidence supplied by the tendency of every alternate furrow to be somewhat deeper, thus uniting the tertiary annuli in pairs. The position of the nephropores in relation to the split annuli on somite XXII, as well as comparison of the 3 known species of the genus, also support the interpretation adopted herein. There are, however, two less probable interpretations than the one adopted in this paper. Until material for a complete anatomical study is available the exact interpretation of the annulation must remain uncertain.

Little is known of the life and habits of this leech. In a letter Mr. Stirling kindly writes that his specimen was found along with another of similar size in fairly dry earth a few inches beneath the surface while he was excavating a ball court in the forest. They impressed him as being black (probably dark slate color) and were dry and not covered with mucus, which is obviously true of the preserved specimen. The paratype must be at least 74 years old, as Francis Sumichrast made his collections in Tehuantepec in the late 1860's and early 1870's.

In *D. mexicana* (Baird), the genotype, the

first pair of nephropores, which in most leeches open on somite VIII, are carried forward by long ducts to open on the inner surface of the buccal ring, thus resembling the true land leeches (Haemadipsinae). In *D. mexicana*, also, there is evidence that the first and second pairs of nephridia are united and that the buccal outlet serves both. A similar condition in *D. magna* would explain the failure to find nephropores on both VIII and IX.

Genus **Hirudinaria** Whitman

Hirudinaria javanica similis, n. subsp.

Fig. 4

Material examined.—Four specimens, including the type (U.S.N.M. no. 20644). Collected at Yun Hsien, Yunnan Province, China, by W. L. Jellison, March 16, 1943. One specimen, labeled "Indian Museum, Z.E.V. 4871. Mainma Dist., N. Burma, Chinese frontier," collected by T. Rennie, June 10, 1911, from pool of water in which buffaloes wallow. This specimen was taken with a large number of *H. javanica javanica*, some of which had gonopores in intermediate positions.

Description.—Based upon these five specimens, this form is distinguished from typical *H. javanica* Wahlberg by the separation of the gonopores by nine instead of seven annuli, the male pore being at XI *a2/b5* (ann. 30/31) and the female at XIII *b2/a2* (39/40). In size, form, color pattern, annulation, arrangement of areolae, and other external characters there is complete agreement with typical *H. javanica*, but in a few respects, as in the position of the gonopores, this form seems to pass beyond the limits of variation of typical *javanica*. Among these is the number of sucker rays as counted at the margin, which is 53 or 54 in the specimens of *similis*, while 40 to 48 is most usual in *javanica*. However, this has little significance as some rays are entirely undivided, whereas others bifurcate two or even three times, the last division often appearing close to the periphery of the sucker. The sensillae appear to be relatively smaller but have the same distribution, elliptical form, and angular deviation from the body axis as in *javanica*. Two specimens dissected differ in respect to the female organs from those of *H. javanica* as described in *Fauna of British India—Hirudinea* (p. 217) in having much shorter oviducts and larger prostate glands. Other dissections of *H. javanica*, however, show variations in both respects partly bridging this gap. The salivary papillae on the jaws of one specimen studied are somewhat more numerous, there being on each side about 19 of the smaller size, mostly in a row close to the dentigerous ridge but a few on the jaw peduncle, and 15 of the larger scattered or in short irregular rows on the sides of the jaws. The former measure 0.029 to 0.037 mm and the latter 0.05 to 0.064 in a specimen of medium size.

The difference in the number of annuli separating the gonopores involves not one but two characters, as the positions of the male and female pores vary independently. In the collection of the Indian Museum are specimens of *H. javanica* in which either of these is shifted from the furrow somewhat into the bounding annuli (Moore, 1922, p. 212), the female pore tending to move to a more caudal, the male to a cephalic position, resulting in intermediates between the two subspecies.

Typical *H. javanica* is abundant in Assam and Burma, and present information indicates that in North Burma there is a tendency for the gonopores to separate more widely and that at the northward limit of the known distribution of the species in the Burmo-Chinese frontier area there is a population in which nine full annuli intervene.

The type of *H. j. similis* is an individual of medium size measuring, in millimeters: length 61, to male pore 13; widths, buccal ring 4.4, male 7, maximum (*ca.* XV) 11, anus 3.5; depths at same points *ca.* 3, 2.8, 3.5, 2.3; caudal sucker 7.

ICHTHYOLOGY.—Anchoviella analis, *a new engraulid fish from the west coast of Mexico.*[1] ROBERT R. MILLER, U. S. National Museum.

During the World's Columbian Exposition in Chicago in 1893, the Mexican Government exhibited representative fishes, mostly from the fresh waters of central and southern Mexico. The specimens were subsequently preserved and donated to the United States National Museum. Among

[1] Published by permission of the Secretary of the Smithsonian Institution. Received May 25, 1945.

the many lots in this collection I found four engraulids which, because of a combination of very distinctive characters, are described below as new.

Genus **Anchoviella** Fowler

Anchoviella analis, n. sp.

Fig. 1

Generic reference.—In technical characters this species agrees with the genus *Anchoviella* and the subgenus *Anchoviella* as recently defined by Hildebrand.[2] Gill membranes narrowly attached anteriorly; teeth in jaws small and nearly equal in size; origin of anal fin nearly under that of dorsal fin; more than 15 gill rakers on lower limb of first gill arch; body deep and strongly compressed; anal fin base long; maxillary not reaching joint of mandible (but extending beyond posterior rim of orbit a distance about equal to diameter of pupil) and broadly rounded posteriorly, rather than pointed as in *Anchovia* and *Anchoa*. The size and shape of the maxillary form the principle character by which *Anchoviella* differs from *Anchoa*. Dr. S. F. Hildebrand has kindly examined the types and agrees that the species should be placed in *Anchoviella*.

Holotype.—U.S.N.M. No. 131168, a specimen 82 mm. in standard length, collected in Laguna de Mexcaltitan, Nayarit (formerly Territory of Tepic), Mexico.

Paratypes.—U.S.N.M. No. 130857, three specimens 60 to 74 mm. long, secured with the holotype and bearing the same data. All the types are somewhat shrunken.

The position of the type locality (shown on the American Geographic Society Map NF 13, Guadalajara, edition of 1940) is approximately 9 miles west-southwest of Tuxpan, which is nearly 39 miles northwest of Tepic. Mexcaltitan is a small settlement near latitude 23° N., longitude 105° 30′ W., on an arm of a lagoon which is connected to the Pacific by a meandering channel about 10 miles long. In 1893 this lagoon may have been called Laguna de Mexcaltitan; the original label with the fish read Laguna de Mezcaltitlan.

Diagnosis.—A deep-bodied, compressed *Anchoviella*, with a rather long maxillary (but not reaching to joint of mandible), and with a very long anal fin of 31 to 35 total rays (29 to 31 principal rays),[3] the origin of which is almost directly under that of the front of the dorsal fin.

Description.—In the following description the measurements and counts for the holotype are given first, followed by those for the three paratypes, in order of decreasing size. The method of presentation is essentially the same as that followed by Hildebrand (*loc. cit.*). The measurements were stepped off with a pair of fine dividers and are expressed as percentages of the various parts indicated, usually estimated to the nearest tenth and occasionally to the nearest hundredth.

Standard length in mm 82 (74, 64, 60); head in standard length 4.3 (4.1, 4.2, 4.2); width of body in its depth (measurement approximate) 4.1 (3.9, 3.8, 4.0); depth of body in standard length (measurement approximate) 4.1 (4.0, 4.1, 4.1); eye in head 3.3 (3.4, 3.4, 3.2); eye in postorbital 1.6 (1.6, 1.7, 1.5); post-orbital in standard length 8.2 (7.9, 8.0, 8.05); snout in head 5.4 (5.3, 5.1, 5.3); mandible in standard length 7.4 (7.2, 7.3, 6.75); mandible in head 1.75 (1.75, 1.65, 1.6); maxillary in head 1.75 (1.75, 1.65, 1.6); dorsal base in head 2.5 (3.0, 2.6, 2.8); anal base in standard length 2.6 (2.7, 2.7, 2.85); pectoral in standard length 5.6 (5.1, 5.45, 5.1); pectoral in head 1.3 (1.2, 1.3, 1.2); pelvic in head 2.5 (2.35, 2.4, 2.3); axillary scale of pectoral in head 2.8 (2.7, 2.65, 2.6); dorsal rays 13 (12, 13, 12); anal rays 35 (33, 35, 31); pectoral rays 12–13 (12-12, 13-13, 12-12); pelvic rays invariably 7; scales (approximate) 40 (39, 40, 38); gill rakers (above and below angle of first arch) 19+24 (19+23, 18+24, 19+24).

Body deep and strongly compressed, the thinness exaggerated by shrinkage. Ventral profile more curved than the dorsal. Head rather short and deep, its depth at joint of mandible about 1.3 to 1.4 in head length; snout short and bluntly pointed, projecting well beyond tip of mandible. Dorsal fin rather high and short, the anterior (longest) rays (broken in holotype) reaching far beyond tip of last ray when depressed, its origin equi-

[2] Bull. Bingham Oceanogr. Coll. 8 (2): 11–12, 108–109. 1943.

[3] In the enumeration of principal dorsal and anal fin rays, the first ray counted was the first long, unbranched ray, followed by branched rays; two rudimentary rays invariably precede this ray in both fins. In order to make the counts agree with those in the most recent review by Hildebrand, the total count was used.

distant between caudal base and some point on pupil; anal fin base long, its origin almost directly under that of dorsal origin and equidistant between caudal base and middle to posterior of pupil; pelvics small, extending more than halfway to anal origin, inserted about equidistant between anal origin and pectoral base; pectorals long, extending slightly beyond insertion of pelvics.

Color of specimens in alcohol dark brown, with a silvery band, which is rather wide anteriorly but narrow between dorsal and anal origins and is very narrow on caudal peduncle; its ventral margin is not clear-cut, but the greatest width of the band is about two-thirds to three-fourths the eye diameter. Rather fine, dark pigment spots on tip of snout, along ridge of back, base of dorsal, and a few along base of anal. Sides of head silvery, with a metallic bluish luster.

Relationships.—Anchoviella analis differs from any known American species of the genus in the long, many-rayed anal fin and in the anterior position of this fin. In number of anal rays it is closest to *nattereri* (Steindachner), described from Pará, Brazil, which has 28 or 29 (possibly 30 to 31 total rays). The new species differs prominently from Hildebrand's account of *nattereri* (condensed from Steindachner's description) in the much more anterior insertion of the anal fin (origin of anal about under middle of base of dorsal in *nattereri*), much shorter snout (5.1 to 5.3 rather than 4.0 in head), and in having the maxillary bluntly pointed (rather than nearly square) posteriorly. It is obvious that *analis* is not closely related to *nattereri*. Superficial resemblance is seen between *analis* and *pallida* (Starks), as figured by Hildebrand,[4] but *analis* has much fewer gill rakers (28 to 34+36 to 45 in *pallida*) and more anal rays.

Anchoviella analis much more nearly resembles certain species of the closely related genus *Anchoa*, notably *A. panamensis* (Steindachner), known from Mazatlán to Peru. It agrees with *panamensis* in the number of anal rays, the origin of the anal fin, the shape of the head, the compressed body, and the length of the pectoral fin but disagrees on the important character of the length and shape of the maxillary which, in *panamensis*, is slender and pointed and is much longer, 1.2 to 1.4 rather than 1.6 to 1.75 in the head length. The rather remarkable resemblances between *analis* and *panamensis* may be more real than superficial, however, and *analis* might be considered an aberrant *Anchoa*, with an exceptionally short, blunt maxillary. If that view were adopted, however, the principal generic difference between *Anchoa* and *Anchoviella* would fail and *Anchoa* would become a synonym of *Anchoviella*. To base such a move on the few specimens before me seems entirely unwarranted. Differences judged to be of generic value often lose their sharpness in borderline species.

Associates.—The following species were found wrapped in the same lot with the new species: *Anchovia macrolepidota* (Kner and Steindachner), *Anchoa lucida* (Jordan and Gilbert), *Diapterus peruvianus* (Cuvier), and a species of *Gobionellus*.

Etymology.—The new species is named *analis* because of the very long anal fin base.

[4] *Loc. cit.*, fig. 59, p. 134.

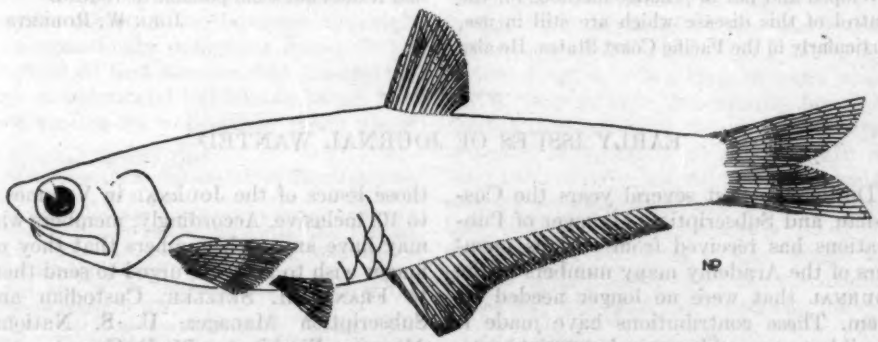

FIG. 1.—Holotype of *Anchoviella analis*, n. sp., U.S.N.M. No. 131168, 82 mm in standard length. Drawn by Nancy Patton.

Obituary

MERTON BENWAY WAITE, retired member of the Washington Academy of Sciences, died on June 5, 1945, after a short illness. He is survived by his wife, Elizabeth Hurdle Waite, and his two sons, Merton and Malden, both of whom are captains in the Army. Dr. Waite was born near Oregon, Ill., on January 23, 1865, of sturdy pioneer stock and was himself a pioneer in the application of botanical knowledge to the art of horticulture.

Waite entered the University of Illinois, presumably to become trained as a civil engineer, but his love and knowledge of plants and the influence of Prof. T. J. Burrell soon turned his major interest to botany, an interest that continued to the date of his last sickness. Following his graduation from the University of Illinois in 1887, he was assistant to Professor Burrell until November 1888 when he was induced to enter the old Division of Vegetable Pathology of the U. S. Department of Agriculture. He continued in this Division and in the Bureau of Plant Industry that suceeded it until his retirement in 1935. In 1919 the University of Maryland conferred on him the honorary degree doctor of agriculture. For many years he was in charge of the Office, later Division, of Fruit Disease Investigations and was an acknowledged authority on that subject. His discovery that the bacterium causing blight of pomaceous fruits was disseminated by insects was epoch-making because it was the first proof that a plant disease could be disseminated by insects and possibly antedated similar discoveries for animal diseases. He also developed and put in practice methods for the control of this disease which are still in use, particularly in the Pacific Coast States. He also contributed greatly to the development of control measures for many other destructive diseases of fruits. He discovered and by elaborate experiments showed conclusively that with certain varieties of pears and other fruits cross pollination is necessary for the setting of a full crop of fruit. This discovery resulted in changed planting plans of orchards throughout the world.

He helped organize and was for 14 years a member of the Federal Insecticide and Fungicide Board that administered the Insecticide Act of 1910. In 1924 he became a member of the Federal Horticultural Board, continuing until its quarantine functions were taken over by another agency.

Waite belonged to many scientific societies, but his favorite was the Botanical Society of Washington, of which he was twice president. He rarely missed a meeting and usually had interesting observations, often supported by specimens, to report. He was deeply interested in the flora of the Washington area and in his later years gave special attention to mosses. He was also an enthusiastic member of the Cosmos Club, seldom missing the Monday "club nights" even when living at his country place 25 miles away.

Dr. Waite was a man of restless energy and enthusiasm throughout his career, even to the day of his final illness. His pleasant smile and sociable nature endeared him to his colleagues and he was always willing to devote his time to the giving out of his large fund of knowledge. He was so full of life and so interested in living that it does not seem possible he is dead.

JOHN W. ROBERTS

EARLY ISSUES OF JOURNAL WANTED

During the past several years the Custodian and Subscription Manager of Publications has received from various members of the Academy many numbers of the JOURNAL that were no longer needed by them. These contributions have made it possible to assemble several complete sets. At the present time there is urgent need for those issues of the JOURNAL in Volumes 1 to 10, inclusive. Accordingly, members who may have any such numbers that they no longer wish to keep are urged to send them to FRANK M. SETZLER, Custodian and Subscription Manager, U. S. National Museum, Washington 25, D. C.

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